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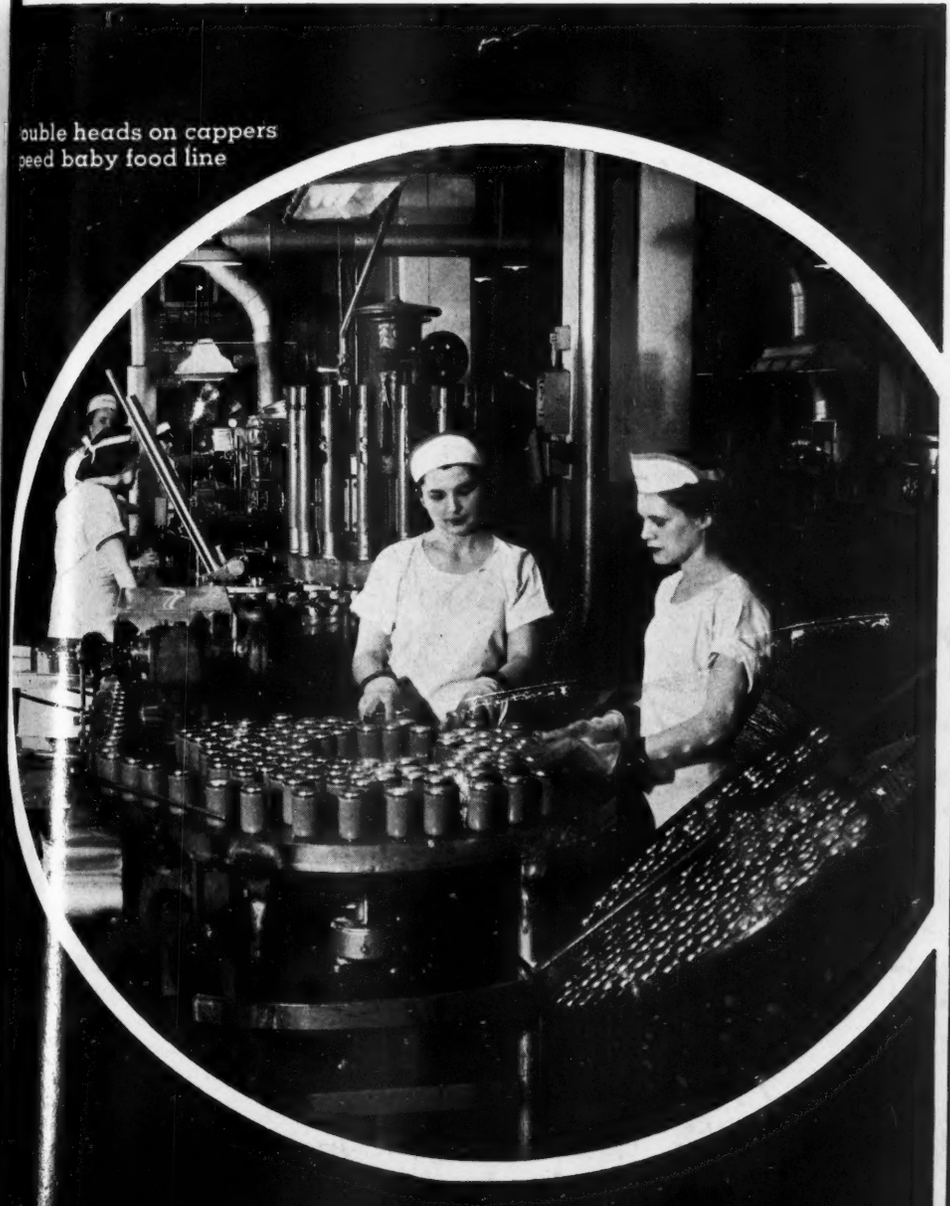
● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION



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SEPTEMBER 1946

Stored Frozen Stock In Preserve Making

Utilizing Water Cooling Towers

Sanitation In The Packing Plant

Problems of Small Plant Management

Successful Canning Of Drinking Water

Fabricating Glass Piping in the Field

Packaging With New Films and Foils

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FOOD INDUSTRIES

FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

SEPTEMBER, 1946 Volume 18, Number 9

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THE COVER

High speed glass packaging of baby food is shown at the Canajoharie, N. Y., plant of Beech-Nut, where packaging lines, incorporating Anchor 16-spindle rotary sealing machines, have operated at sustained speeds of 285 per minute. The jars are vacuum sealed.

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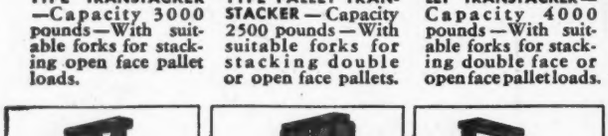

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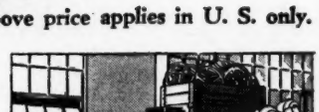

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Watch the Pipe Lines

A problem today is to formulate a sound, long-range policy that will make for peace of mind of management, workers and shareholders when the current American forced draft food production policy reverts to normal. That will occur when the UNRRA food pipe lines overseas are shut off. The shut-off will come when America is no longer able or willing to put up the bulk of the money for food for UNRRA.

Russia is the big "if" in the calculations as to how long the relief exports may be expected to continue. UNRRA officials have recently voiced the opinion that relief shipments overseas should be stopped because Russia had not been cooperating as promised. And soon afterwards, Director Fiorello H. LaGuardia was denounced in the Russian controlled press for insulting Russia.

But Russia's attitude is only one factor to be reckoned with in formulating future plans. There are other factors—confusing factors. Herbert Hoover has announced that mass starvation has been averted except in the remote sections of China. Randolph Churchill (Winston's son) after a three-month inspection of Europe reported on July 2 that the need for food had been exaggerated.

Everyone has met returning GI's who, though not trained, mature observers, report that famine conditions were not seen in areas that they had left. Many report that Europeans in devastated areas refuse to work, produce crops or do anything to extricate themselves. Yet, in contrast to this evidence, a private communication from a man responsible for feeding hundreds of thousands in Western Europe says he has had to cut rations down below the basal metabolism rate to something like 1,200 calories a day.

Contradictions in the News

Contradictory news originates, not only abroad, but right here at home. Meat prices not only "soar" but three carloads of beef—some 60,000 lb.—spoiled and were condemned by the New York City Health Department while prices were "soaring." It does not add up. Neither does bidding up of livestock prices while wholesale meat markets are glutted and consumers balk at retail prices.

The new Price Control Law with its Decontrol Board is oil in the brakes. Which probably won't do a great deal of harm, though adding to the sum total of confusion. Yet it can't do a great deal of good.

Admittedly in a single page one cannot examine all the contradictions that exist even in the food situation. But so many contradictions indicate the existence of opposing forces. Right now the major force is the taking of vast quantities of food from America. How long will this outflow continue? When will the pipe lines carrying the abnormal food exports be shut off? Will it come about abruptly? And what should be normal production?

Plan Strategy Now

If the pipe lines overseas are suddenly closed a year or two hence, the food demand from abroad will come to an abrupt halt. Then, we must cope with a problem of temporary surpluses of many sorts—processed foods as well as grains. FAO may find a remedy but processors may relearn that certain presumably nonperishable foods have a definitely limited "life." In the early Twenties, canned peaches became hydrogen springers. Tomato pulp perforated the cans after standing several years. Brine pickles deteriorated badly. It was a mess—if you are old enough to remember it. It could happen again.

For peace of mind it is important to have a well thought out plan of action. First is the matter of how far a single firm should reduce its production when the UNRRA exports cease. This may call for industry-wide conferences in which both U. S. Department of Agriculture and the Department of Justice should participate.

Second, food technologists should consider what they can do in this situation to add to the merchantable life of processed foods. Possibly the times will call for liberal use of antioxidants, prompt cool or cold storage before deterioration can get started (most folks wait too long and then blame everybody but themselves). Or possibly special containers will be needed.

To prepare deliberately and unhurriedly there should be close cooperation between technical and sales departments, out of which should come a proposed course of action to be taken when the stopping of overseas UNRRA pipe lines is imminent.

The most difficult task, however, will be to convince management to put the plan into force on time when the signal comes.

H. V. Burton EDITOR

The Talk of the Industry

• SHORTAGE of labor is a possibility this autumn, said the Federal Reserve Bank in August. Evidently the FRB had not been trying to get any work done of late.

• AN unofficial report that testosterone is being produced from sarsaparilla root in Mexico by Syntex, Inc. is startling news. Sarsaparilla is said to grow wild in Central America. Natives harvest the roots, dry them and ship to the extraction plant.

Testosterone is a male sex hormone that is said to restore lost muscular vigor, but it is not administered by mouth. Nevertheless, it is likely that sarsaparilla flavored carbonated beverages will again achieve the popularity they enjoyed at the turn of the century.

• EIGHT of the largest bakeries in Philadelphia were struck in mid-August because the workers' take home pay had been greatly reduced by the flour shortage. If that were a valid basis for a strike there are quite a few other unions that could make a case against their employers for reduced work because of strikes in other industries.

• SERVICE on a community board that tries to help ex-GI's to get jobs has revealed some oddities, one of which deserves comment here. A former beer salesman, unable to connect with his old job because of the grain shortage, decided to turn his selling talent to account in the dairy field. On his first try he was offered a job as a milk route salesman and next was told to join the driver's union. But the drivers had a closed shop contract, would not admit him to membership, and that was that!

Democracy is wonderful.

• "OUR FIRST MOVE," said a British businessman during a recent call on FOOD INDUSTRIES, "was to purchase the principal wholesale food distribution facilities. We now control about 80 percent of the food distribution in my country. Hence, if we elect to manufacture anything new or different, we are assured of its ready distribution and sale."

"Won't Clement Attlee and Company quickly take care of your monopoly?"

"Oh, I assure you it's perfectly legal in Britain."

"Yes," we answered, "but, as we understand, it was also perfectly legal to own a coal mine in your country. But that did not prevent nationalization of your mines."

• ONE of the current indoor mysteries is why people will telephone to this publication about OPA controls or decontrols instead of asking OPA itself. Latest inquirer was a bank that had been asked to finance a big deal in soybeans. The value of the collateral could be influenced by OPA action.

• SPEAKING of credit, few persons realize how often financial houses confer with FOOD INDUSTRIES about food company affairs, especially about banking accommodation, and investments.

• MECHANIZATION of cotton culture, especially of cotton picking, bids fair to contribute a prolonged period of prosperity to cotton planters and may have a noticeable effect on the economy of the South. Such mechanization is a further step in the industrialization of the South, which will, in due course, improve its buying power, and indirectly its consumption of processed foods. It will not be, however, all joy to the nation.

Business men who have studied the matter are certain that cotton pickers displaced by the machine will migrate to northern industrial cities and create problems larger than those solved by the machine.

At any rate, the South spells opportunity, just as the West did when Horace Greeley voiced his famous admonition.

• DEERFIELD PACKING COMPANY, Bridgeton, N. J., made an innovation to help relieve the labor shortage by flying 50 young women from Jackson College, Jackson, Miss., for summer work in the plant in south Jersey. These girls were the first of about 400 students from Negro women's colleges in the deep south.

Such a method of securing seasonal help is possible only where the company has adequate housing facilities, and it can be repeated only when the invited migrants enjoy their summer work.

Hors d'Oeuvres

•*In case there are some lingering doubts about the power of propaganda, have a look at the consumers' testimony at the decontrol board's hearings in Washington, last month. The old OPA not only sold 'em but kept 'em sold.*

• The decontrol board may not have believed everything it read and heard, but the meat industry doubts it.

• *Some thought must now be given to getting all that meat back into the black market channels. It might be a formidable task, but we have every confidence in the boys.*

•An OPA set of looseleaf folders containing press releases on food, is reported by Pathfinder. They are neatly tabulated in alphabetical order. The last volume is headed, "Nuts to Wheaties."

•*Establishment of folic acid among the vitamin B series adds to a problem that something should be done about. Otherwise we are going to find ourselves, in a few years, running into something like vitamin* B_{621}.

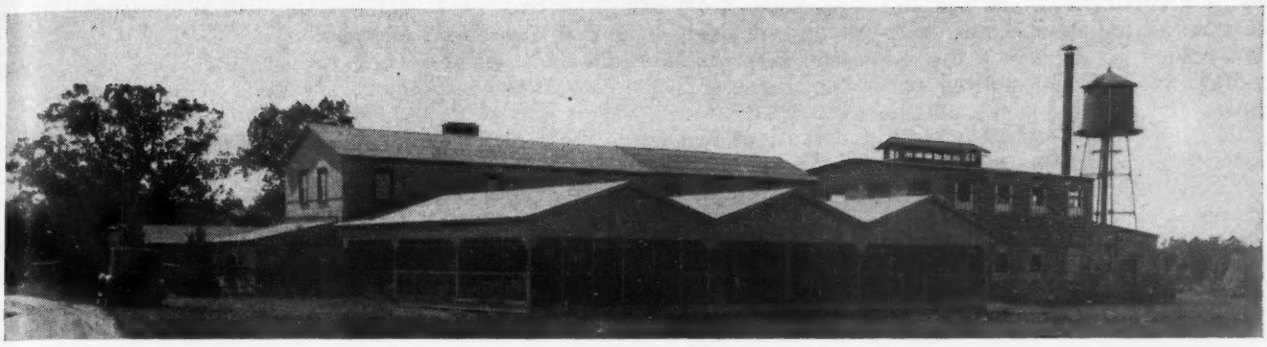
•Now that canned potatoes are joining ranks with precooked meats and more and more prepared desserts, one can't help wonder what the housewife is going to do with her working time.

•*"Dry table wines," says the Encyclopaedia Britannica, via the Wine Institute, "alone among all common beverages of man, are produced entirely for mealtime use". We won't argue the point, but we bet a lot of coffee and tea people are surprised.*

•The Wine Institute also says that "wine is essentially a drink of moderation; when used to excess, wine itself is abused." If that were only all.

•*The H. J. Heniz Co., calls one of the dehydrated products "Magic Onions." No peeling, no chopping and no tears. All they say about the taste is that it's uniform. That ain't enough.*

J.A.J.J.



Managing A Small Plant Is A Large Task

Whether individually owned or part of a corporation, the small plant must be operated efficiently. The manager must usually depend on his own resources, business acumen and employee psychology to fill the job

By H. WILLARD RICHTER, Administrative Assistant
Food Engineering Division, Maxson Food Systems, Inc., New York

FOR the purposes of this article, we shall consider a small plant to be one employing from 15 to 100 people. There will always be a great deal of overlapping of size, however, depending on the type of establishment under consideration and the type of product manufactured. A factory may have a large volume of output, but relatively few employees, due to the type of production machinery used. Therefore, it would fall into the small plant group. Spray-drying operations furnish excellent examples. Here, the operation is continuous and tons of finished goods may be produced in one day with less than ten men. In coffee roasting and packing, the operation is continuous from the dumping of the green coffee to the finished product storage pile. Because of automatic machinery and floor to floor conveying systems, the tonnage of finished product per employee is high. In contrast, one might consider the other extreme where the number of employees is high in comparison with the output of the plant. This occurs when hand operations prevail. Nut shelling and crab canning are examples.

From the standpoint of ownership, small plants may be individually owned, a partnership, or a branch of a national organization. The part the individual manager plays is very much the same whether he reports to himself, to his partner, or to the corporate management. The challenge goes out to the man who can keep the plant producing efficiently on his sole responsibility.

Mayonnaise Plant

Let us look into a small branch mayonnaise plant situated beyond the point where it is economical to ship from the main home plant. The establishment of such a branch becomes necessary when perishable foodstuffs, which are subject to spoilage due to long haulage, are manufactured or when the need for frequent store-to-store distribution is imperative.

Such a business could be conducted in a high-ceilinged one-story building, about 100 ft. long by 60 ft. deep. One of the long sides should be parallel to the street and the other one along a railroad siding. This arrangement provides ample trucking and railroad facilities for incoming raw materials and for outgoing products. A small cellar is necessary for salad oil storage and to house a boiler to provide steam for processing and heating. The flow of material is arranged to do the mixing, filling, packing, and shipping from the main floor. There is an advantage in having two production lines, which serve when there is a rush or a breakdown. When production is steady, the plant can operate with one line. Seven men could operate such a plant. One of them would be the truck driver, if the trucking is to be done by the plant itself. An office staff would consist of a bookkeeper, a stenographer, and two billing clerks. The size of the clerical staff would depend on the territory served and the number of customer accounts. Supervising the manufacturing and the office would be the manager, whose main responsibility is to keep the plant operating efficiently and the finished product up to standard. It is assumed he would not be concerned with sales or advertising.

Here is, indeed, a challenge to the ability and the ingenuity of the

boss of a small plant. To him are delegated all the functions of operation, which in a large plant are handled by highly specialized personnel. These are some of the "musts" he has to be prepared to handle on his own.

The manager must locate for purchase and check the specifications and price of all raw and packing materials. These must be routed in sufficient quantities to meet the average and seasonal requirements. He must know how to control his purchasing in order to take care of perishable items by refrigeration or storage, and at the same time avail himself of quantity discounts. While it may be feasible to contract for a year's supply of jars, the fluctuation in price and the perishability of eggs may require a commitment over a shorter period of time. In addition to the raw materials, the supplies of mechanical maintenance, such as spare machine parts and cleaning materials, must be stocked and controlled to avoid costly shutdowns.

Must Know Accounting

The management must be familiar with the principles of accounting. He supplies basic information periodically to the main office in the form of reports, which are used to establish manufacturing costs and selling prices. It is up to him to be able to interpret the results as they apply to his own plant. He must know how to set up and follow a budget, for his particular factory. In the case of an independent business, the manager establishes his own cost accounting system in order to determine his selling price.

Simple production control systems are needed so that the boss may keep his finger on the pulse of the business. These records provide him with information on daily plant operations and with checks against process losses, possible wastage, or the disappearance of raw and finished products. The most common forms are the daily production program, the weekly inventory of raw and packing materials, and the daily balance of stores inventory of finished products.

Credit Control

The manager must keep an active credit control on his accounts receivable. Customer accounts must be closely watched in order to keep past due accounts to an absolute minimum. The longer a past due account is allowed to lapse, the harder it is to make a settlement. Delinquents must be promptly pressed and, in case of failure to pay, legal action taken.

Traffic conditions and freight rates vary with the locality and the section of the country. The manager must be familiar with all available means of transportation in his area, so that when emergencies arise he may be able to expedite the shipment of his raw and finished products. As a general rule, the most economical and reliable means of transportation should be used. The choice of carrier, however, depends upon the perishability of the raw and finished products. Because of extreme weather conditions, during certain seasons, it is safer and more economical to ship mayonnaise, and other perishable products, by fast overnight motor truck, rather than by L.C.L. railroad drop shipments.

At the present time, more and more emphasis is being placed on the careful study of personnel problems as a basis for establishing closer relationships between management and labor. While personnel directing is becoming a profession in itself, the manager of a small establishment carries on this function with his experience and common sense as his guides. The whole tempo of the plant is reflected by the attributes of the manager. He must uphold the policies that have been established by his superiors in the main office, or which he chooses to establish for himself, if he is operating his own business. He translates them into a workable program for that particular plant. He must have the goodwill of his business associates and the respect of the community as a whole. He maintains good business relationships by establishing a just and a fair labor policy, thereby gaining the support of his employees. If there happens to be an employees' union in the plant, he must be able to understand its purpose, its wants, and its operations in order to be able to sit down and negotiate with its representatives.

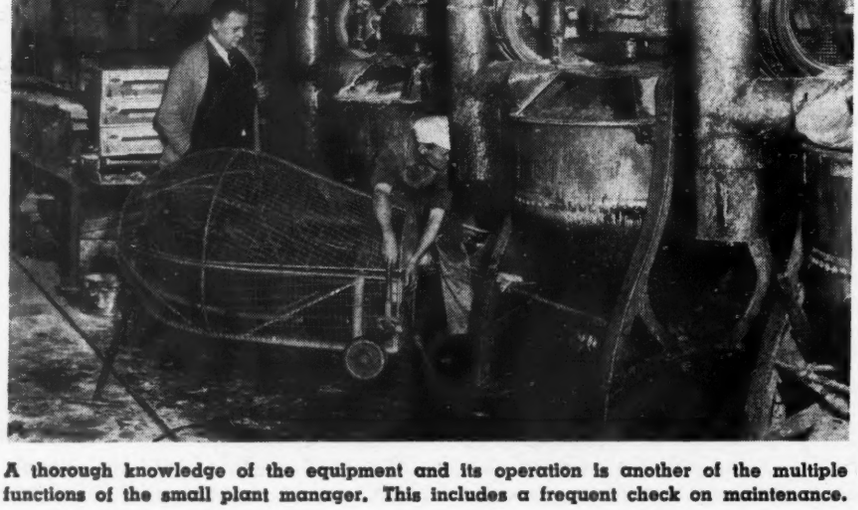
Employee Morale

Faithful service should be recognized and rewarded. On the other hand, employees who violate established rules and regulations must be disciplined. Many factories are located in communities where local customs and practices must be understood and considered. For instance, in the South the 10 o'clock and 3 o'clock soft drink refreshment period is highly important to the workers. Certain religious and state holidays must be observed in accordance with the custom of the community.

Workers' morale should be fostered by providing pleasant working conditions, especially in the lunch and rest rooms, and by providing and promoting recreational activities.

It is amazing to see the type of personal problems that a plant manager has to cope with outside the normal realm of business. He is looked upon by his employees as a combination minister, lawyer, doctor, financial adviser, and judge of a domestic relations court. As such a mentor, he should be able to handle these problems with finesse. He must gain the confidence of his

(*Turn to page* 230)



A thorough knowledge of the equipment and its operation is another of the multiple functions of the small plant manager. This includes a frequent check on maintenance.

Stored Frozen Stock Produces Better Preserves*

Preserves freshly made from frozen stock have better color and flavor than those made from fresh stock and stored at room temperature. Also, this method provides year round operation. Sulphiting yields poor preserves

By HELEN H. THOMPSON, S. R. CECIL and J. G. WOODROOF
Georgia Agricultural Experiment Station, Experiment, Ga.

Inspecting fresh strawberries.

EVERY preserve maker has to decide whether he will store his preserve stock or his finished preserves. He is also confronted with the question of the best storage conditions for stock or finished goods. Raw fruits for preserves are perishable and very seasonal. The plant must operate at capacity for only a short time and remain idle for most of the year, or else some means must be used to hold the preserve stocks until they can be more leisurely worked up after the rush of harvest season. The present report contains data evaluating preserves made from sulphited, canned, and frozen peaches and strawberries as compared with stored finished preserves.

Since preserves are marketed the year around, some means must be provided for storing either the finished or unfinished product; and since a certain amount of deterioration takes place in both types of product, it is well to study the conditions that produce the best final product throughout the year. The chief objections to storage of preserves or preserve stocks are due to oxidative changes, which seriously impair natural color, aroma, flavor, and desirable consistency. While there is not much information available on the darkening of fruit preserves, considerable work has been reported on other fruit products, notably fruit juices. Moore, et al.,[1] found that darkening of orange juice is accelerated by warm storage temperature at 120 deg. F. and retarded by low temperature storage of 40 deg. F. The rate and intensity of darkening were not significantly affected by intense light exposure. Beattie, et al.,[2] observed during storage of currant, raspberry, and strawberry juice a progressive darkening in color with increasing temperatures. Flavor changes also occurred at high temperatures. Moon, et al.,[3] considered the preserves from many varieties of peaches unattractive as a result of the presence of brownish discoloration that developed during five months of storage. Culpepper and Caldwell[4] noted that the color of fresh strawberry jams gradually changed during storage at room temperature, becoming dull and ultimately unattractive. Joslyn[5] reported that darkening in sirups was due to the formation of secondary products of oxidation, containing humic-acid-like complexes. These, upon polymerization yield caramel, which gives preserves an objectionable brown color and oxidized odor and flavor. Charley, et al.,[6] found that the jelly of plum jams became slightly more rigid after six months. Stout[7] found no perceptible change in either color or flavor of strawberry jam held at zero for 15 months. Cox[8] suggests a frozen fruit mixture with added acid and pectin that may be made into jam or jelly in one minute as a means of better retention of color and flavor than is found in jams or jellies at room temperature. Crang, et al.,[9] found the pectin and setting quality of fruit for jam making satisfactory in products preserved by heat methods, but a considerable loss of both was found in the fruit preserved with sulphur dioxide in the cold. This loss was greater in the soft fruits than with stone fruits and apples.

Materials and Methods

The peaches used in these tests were of the Golden Jubilee variety. As the preserves made from this variety brown rather readily, they could be used as indicators of adverse conditions during the entire experimental procedure. The peaches were used fresh to serve as a control and were kept for 3, 6, 9, 12, and 24 months by freezing, by canning, and by the addition of sulphur dioxide solution to make 1,500 ppm. sulphur dioxide. Finished peach preserves were stored at room temperature, at 34 to 36 deg. F. and at 0 deg. F. for 3, 6, 10 and 15 months. Those at room temperature were stored in both light and dark.

The strawberries were of the Blakemore variety, which produced excellent fresh preserves. Strawberry preserve stock was kept for 3, 6, 12 and 24 months by freezing, and by the addition of sulphur dioxide solution to make 2,000 ppm. sulphur dioxide, containing .02 percent calcium as carbonate. Finished preserves were stored at room temperature in both light and dark for 3, 6, 10 and 15 months. They were also stored at 0 deg. F., with periodic examinations for as long as 15 months.

All of the preserves were made by using 45 percent fruit and 55

*This project was sponsored jointly by the Georgia Experiment Station and the Tennessee Valley Authority and its publication as paper No. 148, Journal Series, is approved by the Georgia Experiment Station Director.

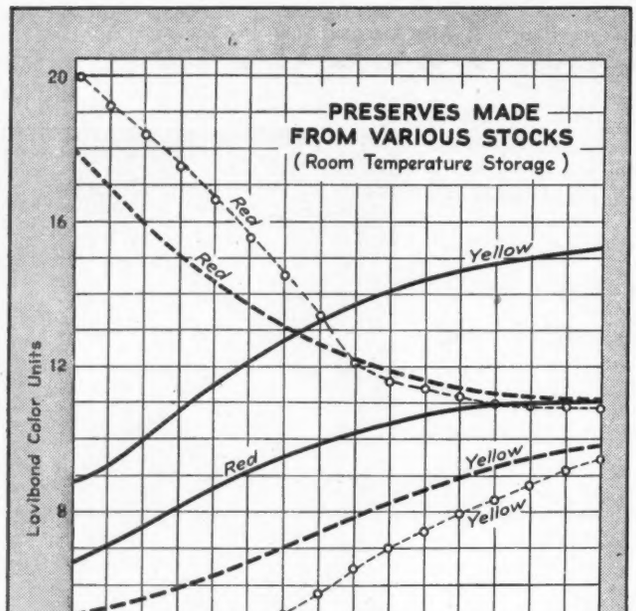


FIG. 1. Color of strawberry preserves made from fresh stock and stored compared to color of preserves freshly made from stored frozen or sulphited stock.

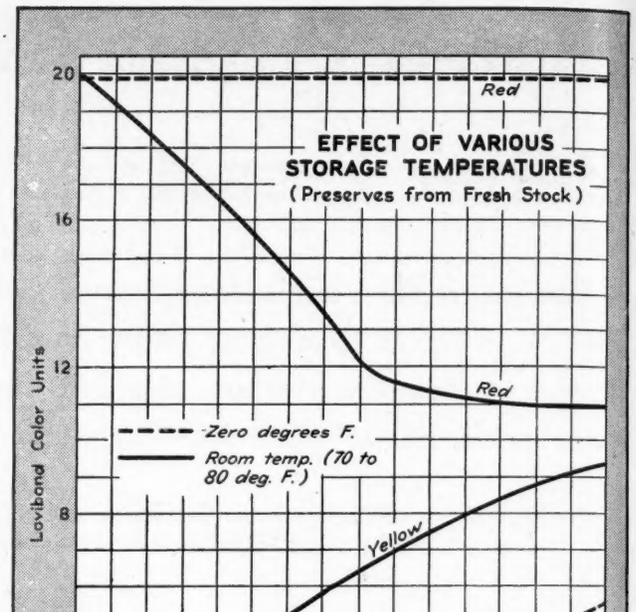


FIG. II. Color change of strawberry preserves made from fresh stock when stored at 0 deg. F. and at room temperature. The red color of those stored at 0 deg. F. remains unchanged.

percent sugar. Frozen fruits were thawed and sulphited fruits were boiled to remove the sulphur dioxide before the preserve making process was begun. Pectin and citric acid were added in proportions needed to increase the jell, lower the pH, and improve the flavor. The amounts of pectin and acid added varied with the different fruits, but not with the means of storage. Preserves were made by modifications of Algie's formula, as follows:

Fresh Peach Preserves

9 lb. sliced peaches
11 lb. sugar
23 g. (.85 oz.) pectin
24 g. (.89 oz.) citric acid

Mix the pectin with about ½ lb. of dry sugar; add the remainder of the sugar and one pint of water to the peaches in a steam jacketed kettle; heat slowly until the sugar is dissolved, then cook rapidly to 220 deg. F. Dip out enough sirup to dissolve the pectin-sugar mix, then remix; add the citric acid dissolved in about a cup of water. Continue boiling to 222 deg. F. (65 percent soluble solids).

Frozen Peach Preserves

11¼ lb. freshly thawed peaches, packed with 20 percent sugar
8¾ lb. sugar
23 g. pectin
24 g. citric acid

Use the same procedure as for fresh-peach preserves.

Canned Peach Preserves

11¼ lb. canned peaches, packed with sugar without water
8¾ lb. sugar
23 g. pectin
24 g. citric acid

Use the same procedure as for fresh-peach preserves.

Sulphited Peach Preserves

10 lb. sulphited peaches, 10 percent water added
1 lb. sugar
23 g. pectin
24 g. citric acid

Boil off sulphur dioxide by adding two volumes of water and boil for 30 minutes, making further additions of water as necessary to keep the volume from falling below that of the original. After boiling to remove the sulphur dioxide proceed as for fresh-peach preserves.

Fresh Strawberry Preserves

9 lb. strawberries
11 lb. sugar
12 g. (.43 oz.) pectin
8 g. (.30 oz.) citric acid

Use same procedure as for making fresh-peach preserves, except cook to 223 deg. F. (68 percent soluble solids).

Sulphited Strawberry Preserves

Use same procedure as for making sulphur dioxide treated peach preserves except cook to 223 deg. F.

Discussion and Summary

Judging of preserves was based on appearance, color, consistency, fruit flavor, sweetness, acidity, bitterness, and texture, to which numerical values were assigned. Highest score was given preserves with a bright, sparkling, translucent appearance; natural fruit color, aroma, and flavor; with well-defined, tender pieces of fruit of uniform size and texture evenly suspended in a tender jelly. A proper balance of sweetness, acidity, and bitterness is desired. A portion of each sample was homogenized and placed in a Lovibond

tintometer to match and record colors as red, yellow, and blue. The color of most of the preserves was matched against standard color plates[10] and given common names. Preserves made by the formulas given continued to stiffen with age, but none of them was completely jelled when freshly made. This facilitated observations of changes in jelly strength during storage.

The chief factors affecting the quality of peach and strawberry preserves during storage were time and temperature (see Table I). No change in quality was noticed in any of the preserves after storage at 0 deg. F. for 15 months. There were slight changes in color and flavor at 34 deg. F. for 15 months, but at room temperature there were constant changes in color, gradual losses in aroma and flavor, and increased firming of the jelly.

Effect of Light

There were no significant differences between preserves stored in the light and in the dark. It is probable that the commonly accepted belief that preserves keep better in darkness arose from the fact that storage places are also cooler and that it is in reality the lowered temperature that provides better storage conditions.

While all qualities of peach and strawberry preserves underwent changes during storage at room temperature, the chief differences were in the changes in color (Table II). There was a progressive increase in browning and final appearance of grayness, loss of luster, and dullness. Aroma and flavor losses and increase in jelly stiffness accompanied changes in color.

Preserves made from frozen or canned fruit had a slight loss in color and flavor, but less than occurred in preserves made fresh and stored. Storing preserve stock by freezing for as long as 24 months gave excellent results; storing freshly made preserves at freezing temperatures for as long as 15 months gave equally good results.

Sulphited peaches were more satisfactory for preserves than sulphited Blakemore strawberries, but neither are recommended in the light of the highly satisfactory results obtained from the use of low temperatures. Preserves made from sulphited peaches were quite good for six months but after that time they were unsatisfactory.

These results indicate that refrigeration must be a part of high-quality preserve manufacture. If throughout the year preserves of high and uniform quality are to be made from peaches and strawberries, the preserve stock must be refrigerated. The preserves may be made while the fruits are in season and held under refrigeration until distributed, but this limits packing operations to the relatively short period that the fruits are in season.

(*Turn to page* 242)

TABLE I—The Effect of Storage Temperature on the Color and Flavor of Peach and Strawberry Preserves

Preserve stock—Method of preservation	Storage Time months	Storage Temperature °F.	Preserves — Lovibond color — Yellow	Red	Blue	Y/R	Total increase percent	Fruit flavor	Total score (100)
Peaches:									
fresh	0	—	13.0	3.5	0	3.72	—	++++++++++	97
fresh	15	70-80	17.0	10.2	1.00	1.66	71.0	++++++	71
fresh	15	34	13.0	3.8	0	3.42	1.8	++++++++++	95
fresh	15	0	13.0	3.5	0	3.72	0	++++++++++	96
frozen	0	—	12.5	3.0	0	4.17	—	++++++++++	93
frozen	15	70-80	14.0	5.6	1.15	2.50	34.0	++++++	78
frozen	15	34	12.5	3.1	0	4.03	0.6	++++++++++	93
frozen	15	0	12.5	3.0	0	4.17	0	++++++++++	93
canned	0	—	12.0	3.0	0	4.0	—	++++++++++	89
canned	15	70-80	13.0	5.5	2.00	2.38	37.0	++++++	75
canned	15	34	12.0	3.1	0	3.75	0.7	++++++++++	88
canned	15	0	12.0	3.0	0	4.0	0	++++++++++	89
sulphur dioxide	0	—	10.0	2.5	0	4.0	—	++++++++	83
sulphur dioxide	15	70-80	14.0	5.5	1.30	2.50	66.0	+++++	63
sulphur dioxide	15	34	10.0	2.5	0	4.0	0	++++++++	82
sulphur dioxide	15	0	10.0	2.5	0	4.0	0	++++++++	83
Strawberries:						R/Y			
fresh	0	—	2.0	20.0	0	10.00	—	++++++++++	98
fresh	15	70-80	9.0	11.0	1	1.22	—4.5	++++++++	78
fresh	15	0	5.0	20.0	0	4.00	14.0	++++++++++	97
frozen	0	—	2.0	18.0	0	9.00	—	++++++++++	95
frozen	15	70-80	13.0	12.0	3.62	0.92	43.0	++++++++	75
frozen	15	0	5.0	18.0	0	3.60	15.0	++++++++++	95
sulphur dioxide	0	—	9.0	5.0	0	0.55	—	++++++	73
sulphur dioxide	15	70-80	18.0	10.2	3.62	0.56	127.0	+++++	61
sulphur dioxide	15	0	11.0	5.0	0	0.45	14.0	++++++	73

TABLE II—The Effect of Storage at Room Temperature on Preserves Made from Fresh, Frozen, Canned and Sulphited Fruit.

Storage months	Attractiveness (20)		Natural fruit color (20)		Consistency (10)		Fruit flavor (30)		Sweetness (5)		Acidity (5)		Bitterness (5)		Texture (5)		Total score (100)	
	Preserves from fresh fruit—(P)= peaches—(S)= strawberries																	
	(P)	(S)	(P)	(S)	(P)	(S)	(P)	(S)	(P)	(S)	(P)	(S)	(P)	(S)	(P)	(S)	(P)	(S)
0	20	20	19	19	9	10	29	29	5	5	5	5	5	5	5	5	97	98
3	16	18	16	16	9	10	24	28	5	5	5	5	5	5	4	5	84	92
6	14	17	12	15	10	10	22	26	5	5	5	5	4	5	4	5	76	88
10	14	16	11	14	10	10	21	24	5	5	5	5	4	5	4	5	74	84
15	13	15	10	12	10	9	20	23	5	5	5	5	4	5	4	4	71	78
	From Frozen Fruit																	
0	20	20	18	18	8	9	28	28	5	5	5	5	5	5	4	5	93	95
3	18	19	15	15	9	9	25	28	5	5	5	5	5	5	4	5	86	91
6	17	17	14	13	9	9	23	27	5	5	5	5	5	5	4	4	82	85
10	17	14	14	12	10	9	22	25	5	5	5	5	4	5	4	4	81	79
15	17	14	13	11	10	9	20	22	5	5	5	5	4	5	4	4	78	75
	From Canned Fruit																	
0	19		17		8		26		5		5		5		4		89	
3	18		15		9		24		5		5		5		4		85	
6	16		14		10		20		5		5		5		4		79	
10	16		13		10		19		5		5		4		4		76	
15	16		13		10		18		5		5		4		4		75	
	From Sulphited Fruit																	
0	17	14	16	14	7	7	24	19	5	5	5	5	5	5	4	4	83	73
3	16	13	14	12	8	7	21	18	5	5	5	5	5	5	4	4	78	69
6	15	12	12	10	8	8	19	17	5	5	5	5	5	5	4	4	73	66
10	13	11	10	8	9	8	18	15	5	5	5	5	4	5	4	4	68	61
15	12	10	8	7	9	8	16	15	5	5	5	5	4	5	4	4	63	59

SUGAR—A Philippine Dilemma

Rehabilitation might be rapid enough to fill half the quota in 1948 and the full quota in 1949, if present economic maladjustments can be overcome. But the Commonwealth's future markets are far from secure

By HERBERT LEOPOLD
McGraw-Hill World News Far Eastern Representative

SUGAR in the Philippines has acquired a bitter-sweet taste. To prewar headaches over markets, quotas and shipping priorities, Japanese military depravity has added worries over rebuilding a totally destroyed industry. All sugar people in the Islands agree that there is nothing to replace sugar as the No. 1 export crop, that the Commonwealth has no chance to get back on its economic feet without the sugar trade. Yet, these same people will tell you that Philippine sugar has no chance in the postwar world, except the chance of losing money.

Cotton For Cane

The Japanese took over a country that produced a surplus of sugar but no single bale of cotton. Putting two and two together, the Japs decided to convert cane fields to cotton cultivation. Americans and Filipinos had tried that before and had failed. Nothing dismayed, the Japs tried again and failed again. Actually, only five percent of the sugar plantation area was planted to cotton because there was not enough cotton seed to go around. Some sugar cane was allowed to remain under cultivation, to supply local needs and furnish sugar and bagasse for the fermentation of alcohol, for use as fuel in Japanese automobiles and as base for synthetic whiskey and *sake*. The planters however revolted at the prices paid for their cane and allowed it to rot in the fields.

When the American forces reoccupied the islands, army investigators totaled up 11,551* hectares of productive cane fields, out of the 210,000 hectares that had been under cultivation in 1941.

The first need, therefore, is for the replanting of the idle fields. Technically speaking, this is not a task that requires a distressingly long time to complete. An American field officer of the Philippine Sugar Administration recorded the rehabilitation progress of one plantation, which had set to work immediately after the Jap defeat. Within 15 months this plantation was able to increase its acreage 75 times, from 4.5 hectares to 337.5 hectares. The overall performance of plantations since the arrival of the Americans however, was not remotely as good. By May 1, a little less than 50,000 hectares were reported under cultivation, and that is less than one-fourth of the prewar acreage.

The reason for the slow rate of rehabilitation, the sugar people explain, is the temptation to sell the canes for milling rather than keep them for seedlings. One kilogram (2.2 lb.) of brown centrifugal sugar fetches $1 to $1.30 in the local market, and since, under the existing share-cropping and share-milling system, plantation owners and tenant planters are paid in sugar, it is highly profitable to mill the little cane that is on hand as long as the fancy black market persists.

Import 12,500 Tons

Legislation putting a temporary ban on milling might be a way out but will not be seriously considered before the recent imports of sugar have taken full effect on prices. Thus far this year the U. S. Army has imported about 5,000 tons, an American firm 600 tons and the PRRA (Philippine UNRRA organization) 5,000 tons from Cuba and 1,900 tons from Peru.

Other factors tending to retard rehabilitation of the sugar fields are shortage of fertilizers, work animals and tractors, mounting labor unrest on plantations, and the difficulty of restoring law and order in the bandit-ridden provinces.

Estimated total production of cane for the 1945-46 milling season (October-March) was 298,738 tons, sufficient to yield 23,241 tons of centrifugal sugar. This is about one third of one day's prewar production. Actual production did not even reach this figure because the mills capable of partial operation, six out of the original forty-one, are all located in the same district (Luzon), leaving the majority of plantations without milling facilities. It is not known what proportion of the unmilled cane was used for reproduction.

Even though the technical obstacles to quick rehabilitation of the sugar fields are not insurmountable, it is not likely that planters will even try to get back on their feet before the milling and refining industries are ready to go to work on the cane produced.

None Escaped

The damage to milling establishments, locally called centrals, is beyond description. Perhaps in no war-ravaged country has one widely dispersed industry been so thoroughly knocked out as the Philippine sugar industry. Out of 41 centrals, spread over six islands and twice this number of provinces, not one survived the war in working condition. Nine had to be written off as total or near-total losses, 15 were taken over in badly damaged condition, and 17 were partially damaged. Out of the total of 41, 11 are American-owned (including one Spanish-American property), representing a capital investment of $35,000,000. In addition, both of the refineries operating in 1941, also American-owned, were damaged and looted. The six mills now operating in Luzon, however, are only partially damaged and could be reconditioned at comparatively small expense.

Officials of the American-owned Insular Refining Corporation, Man-

* 1 hectare = 2.471 acres.

daluyong, Manila, which is one of the two refineries in the islands, stated that the overall damage is not extensive although the Japs dealt a crippling blow to the refinery by demolishing the power plant. Reconstruction costs are estimated at $160,000.

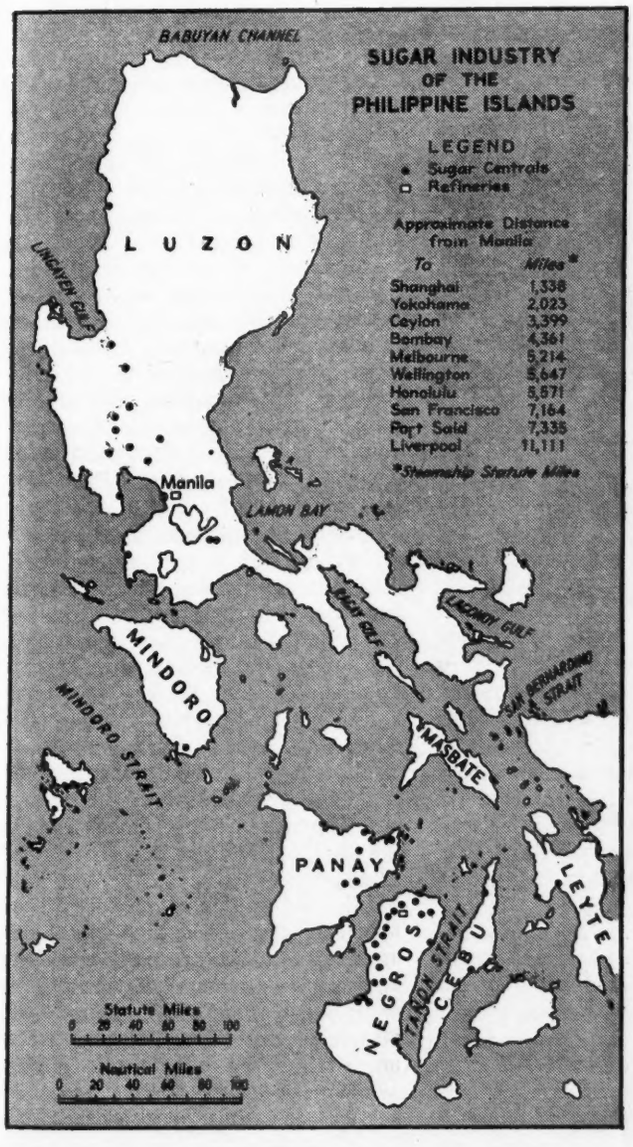
Reports from Victorias, Occidental Negros, indicate that damages to the refinery of the Victorias Milling Co. properties, also American-owned, are more extensive. The boilers are missing, the mills a total loss, the power house and machine shop looted, the rolling-stock dismantled or damaged and the buildings burned. The refinery was partly damaged or looted, but the boiling house is in good condition except for one damaged Oliver filter.

Several factors have combined to keep rehabilitation of the cane processing industry in abeyance. The situation today is similar to the sugar crisis that developed prior to the Spanish-American war, which established American rule in the islands. In 1894, Philippine sugar exports reached nearly 350,000 tons. During the period of disorder that followed, production dropped sharply, with exports in 1899 down to 80,000 tons. The trade lingered for ten years without substantial progress. Then came the Payne Bill of 1909, which admitted Philippine sugar into the United States free of duty. Exports gathered momentum during World War I, and by the time the Philippine Commonwealth was inaugurated in 1935, the total investment in the industry had reached $250,000,000. Sugar constituted nearly 60 percent of the Philippine export trade and contributed to the government to the extent of 40 percent of its income.

There is no Payne Bill today to cause investors to rush headlong into sugar properties. The Bell Bill has taken its place. This sets the deadline for Phillippine-American free trade in 1954, and after much bickering restored the prewar sugar quota of 850,000 long tons on the basis of 1931-33 mill capacities. Ultimately the Philippines will have to sell their sugar where they can find a market for it behind the world-wide tariff and quota barriers. That is not a pleasant prospect for an industry that is saddled with the highest production cost of all sugar growing countries and enjoys no advantage in freight, except in the Chinese and Japanese markets.

Still worse, production cost is going up as old contracts expire and planters ask for an ever-increasing share of the sugar output. The contracts of several mills expired during the war, and negotiation of new contracts will have to

(*Turn to page* 218)



Sugar is important to the rank and file of the Philippines and the rebuilding of its production facilities poses an economic problem that is complicated by investment and market factors.

The Philippines' great distance from the high sugar consuming western nations imposes a handicap that the economic demand from sparsely settled New Zealand and Australia and the low income Orient are not likely to overcome, even though nearer.

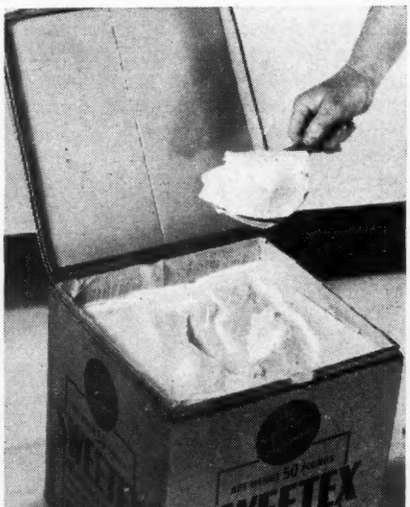
Improved Paper Container For Bulk Shortening

Unable to get 50-lb. metal cans, some firms developed paper substitutes that may find permanent use for many other products. One big problem was to get the carton liners open prior to filling without tearing them

By F. L. Toof, Chemical Engineer, Niagara Falls, N. Y.

DURING the war, many companies were affected by the WPB ruling that prohibited the use of metal in packaging containers for edible shortening. Some companies, anticipating this ruling, were ready with a satisfactory substitute for the 50-lb. package and suffered no production loss due to shortage of containers. One of the first companies to take advantage of the new packaging was Procter & Gamble.

Shortening was normally packed in a metal can and it was necessary to find a substitute that would support the material in a semi-fluid state, as filled, and withstand rough handling and possible high temperatures without oil seepage. After checking available materials not likely to be restricted, paper appeared to be the answer to the problem.



Procter & Gamble used one of the first substitute cartons for bulk shortening.

Container Specifications

The size of the container was calculated from the density of the shortening. A known volume of shortening was weighed to determine its density. Since the desired net weight in a container was 50 lb., this figure was divided by the density of the shortening to get the number of cubic inches required. A 200-lb. test container was made up from kraft paper with straw corrugations. A pad of the same material was used on top and bottom and a sleeve was placed inside the container for support. As this container was not greaseproof, it was necessary to devise a suitable greaseproof liner. The liner had to be free from material that would impart an unsatisfactory odor or taste to the product. Waxed paper proved unsatisfactory. Seventy-pound parchment looked promising. After considerable experimentation, a satisfactory, preformed, coated bag was developed.

Results of Tests

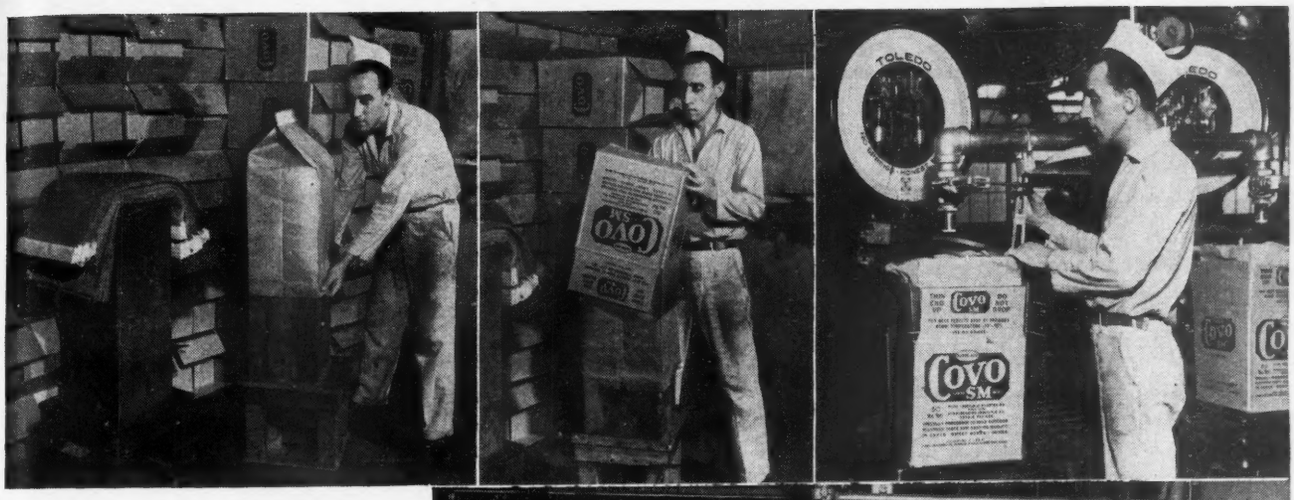
One thickness of 70-lb. parchment was used for lining the substitute paper containers. Shortening was filled into three containers, lined with parchment, and samples held in 0, 70, and 120 deg. F. rooms for one week. Observations, at the end of this holding period, indicated that neither leakage of shortening nor objectionable odors or flavors resulted.

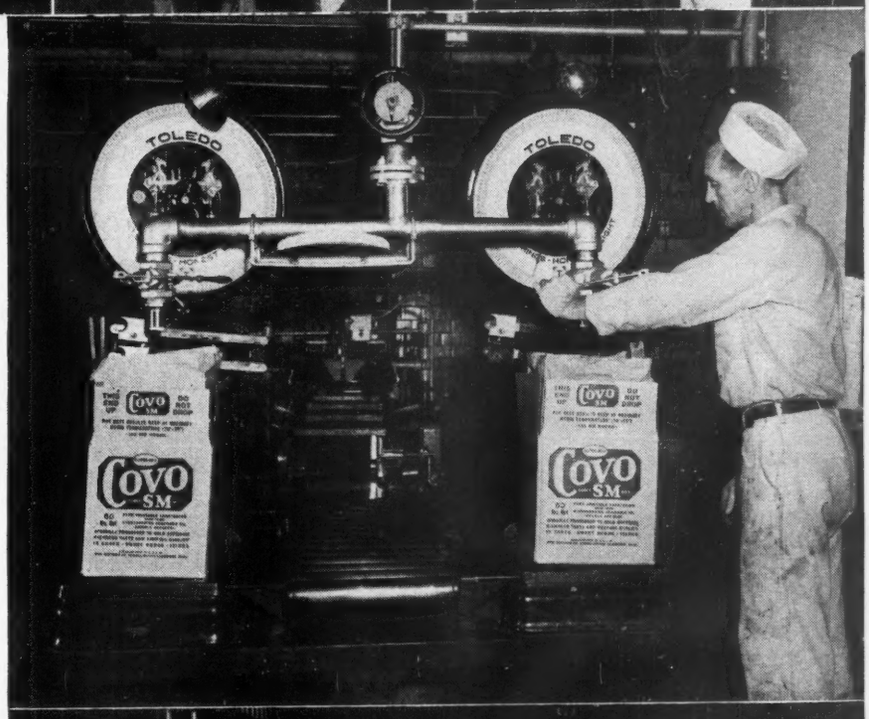
The next step was to substitute a bag for the liner. In order to critically test the efficiency of parchment bags, oil was placed in the bags and storage tests were again conducted in 0, 70, and 120 deg. F. constant temperature rooms. Oil leaked from the seams of all three bags. But neither off-odors nor off-flavors were imparted to the oils by the bags or adhesive. Results indicated that further work was necessary to determine the proper method of applying adhesive to seams to make the bag leakproof.

Gluing Problem

To obtain a comparison of the effectiveness of various gluing operations, several companies were consulted. Samples of parchment and the adhesive were submitted together with the desired bag sizes. Bags were formed and glued by the various bag manufacturers. Finished bags from all suppliers were inspected and tested with oil by holding for one week at the three temperatures employed in the original test. One company was able to supply a satisfactory bag. Observations of gluing operations indicated that a unique method of application was the reason for success.

It was now necessary to furnish the production department with a satisfactory method of assembling and packaging. After a study of the problem it was decided that a foot-operated, folding bag-former would be suitable for the bag-forming operation. Actually, this bag-former worked satisfactorily, save in one respect. The fabricated bag was opened slightly and placed over the closed bag-former. As the bag-former changed from the folded to the open position, the bag was opened. At this point, however, each bag tore because the parchment was dry and brittle. An attempt was made to overcome this difficulty by applying a mixture of water and a plasticizing agent to the bag. After permitting the excess plasticizing solution to drain, the bag was inserted in the container. This





Operations at a Lever Bros. plant. (Upper left): Bags are formed over a wooden mandrel. (Upper center): Containers are put over bags. (Upper right): To prevent collapse of bags, in filling, hoops are inserted. (Right center): Containers are filled with semi-liquid shortening. (Lower right): Here containers are automatically sealed, then shipped or stored.

method proved unsuccessful. After considerable experimental work, a suitable coating, consisting of water and a suitable plasticizing agent, was developed. When applied to the parchment bag, the coating made the bag pliable and avoided tearing.

A corrugated kraft sleeve was secured to the inside of the container by a band of glue. Over the formed bag were placed both the assembled sleeve and container. Finally, the prepared container was placed on a conveyor and taken to the filling line. By the time the container reached the filling line, the glue had dried and the bag was sealed to the container. An alternate method, used by Lever Bros. Co., involved inserting a wooden hoop in the liner to prevent it from collapsing during filling.

The prepared container was then filled on a packing scale. A parchment sheet was placed over the shortening and a corrugated pad over the sheet. Each container was sealed in an automatic sealer.

The container was opened at the top by the user in the usual manner. Shortening could be removed from the container in amounts desired. Or, by removing the top, emptying the bag and "peeling," the entire block could be used. Solution of this wartime problem resulted in a neat package. Undoubtedly there will be many uses for this container after metal has become plentiful for such commodities as butter, oleomargarine, lard and cheese.

How To Fabricate Glass Pipe In Your Plant

Out of wartime necessity, at the Oak Ridge, Tenn. plant for making U-235 for atomic bombs, has come a faster and better way to install glass pipe. Using technics that closely follow those of soda glass manipulation, it is possible for pipe fitters to become expert manipulators of Pyrex glass. Fewer detailed drawings are needed.

By B. W. WHITEHURST, Engineer,
Stone and Webster Engineering Corp.,
Boston, Mass.

FIG. 1. Cutting Pyrex tubing. After the tubing is scored, a nichrome wire loop is adjusted around it. Electric current, controlled by the transformer (left) is applied until the wire is a dull red color. After approximately one minute the current is turned off, the wire loop removed and a damp cloth applied until the tubing breaks.

BORO-SILICATE glass piping, known by the trade name of Pyrex, has many advantages in the food processing industry and the manufacture of bio-chemicals, as well as in general chemical processes. Among these advantages may be mentioned: its resistance to most acids and its transparency, which permits the operator to observe the processed material being transported.

The use of Pyrex piping to conduct chemical fluids is not new, but when Stone and Webster Engineering Corporation installed, at the Clinton Engineer Works, Oak Ridge, Tennessee, over 7½ miles of glass piping in sizes up to 4 in., a gigantic forward step in construction technic was achieved. To accomplish this, a shop was erected in the field, completely equipped with bench model sealing jigs and electric glass cutting, sealing and stress relieving equipment, for the fabrication of glass piping in a manner not unlike that used for steel pipe. This was the first time in engineering history that large scale field fabrication of glass piping was attempted and successfully completed.

Many novel technics were developed and used by the construction forces, and methods heretofore considered as laboratory practices were converted overnight to standard field procedures. Some idea of the magnitude of the job may be realized when one considers that over 35,000 cuts were made in the glass piping, and over 30,000 sections were fused together, necessitating the making of 15,000 welds. Over 3,000 special fittings were made, some of these exceedingly complex.

Prior to this time, the orthodox method of equipping an installation with glass piping was to submit to the supplier an assembly drawing, showing the location of each piece of equipment, the location of the connecting piping runs, and detailed drawings of the individual glass fittings, if they were of a special nature. The supplier prefabricated the piping and shipped it to the site, where it was unpacked, assembled and installed. Even though this method lacks flexibility, prior to the war it was considered by engineers to be satisfactory. Examples of its limitations are:

1. Where the location of heavy equipment is changed to conform to revisions of flow diagrams.
2. When the design or locations of the equipment outlets are not crystallized.

These and similar conditions required revision of drawings and further negotiations with the supplier.

Under impetus of the exceedingly close time schedules prescribed by the War Department, it was reasoned that the solution to the problem lay in the cutting, welding and fabricating of the glass piping in the field. The Corning Glass Works cooperated in this undertaking by leasing several sets of glass welding equipment and by assigning one of their engineers, versed in glass technics.

One of the major problems was that of obtaining proficient glass

workers. Pipefitters were trained to fabricate glass piping. It was recognized that they were embarking on a new type of work requiring technics acquired only through experience and application to detail. By the time the fabrication of glass piping and fittings had reached its peak, about 25 pipefitters had become skilled glass artisans.

Boro-silicate glass piping, in the hands of skilled glass workers, offers the same flexibility in bending to special shapes and in the fabrication of manifolds as does metal pipe, except that the sealing, bending and flanging require specialized methods of production. In general these technics closely follow those of soda glass manipulations, except that higher temperatures are required for bending and sealing. Gas flame alone, even at temperatures of the oxygen-hydrogen torch, does not supply sufficient heat to make a satisfactory seal except for thin wall tubing.

The installing of glass pipe demands close attention to support and hanger details, to the correct axial alignment of the piping, and the parallel alignment of the flange faces before taking up the bolts. The insertion into the pipe line of expansion or slip joints, or the use of loops to compensate for thermal expansion, must be considered. Where the piping is run along walls and columns, adequate protection should be provided against damage by collision. Likewise, protection from falling objects must be afforded and the placing of ladders and other construction equipment against the installed pipe avoided.

Cutting

Cutting of glass tubing was an early accomplishment in glass manufacture. Soft soda glass was scored peripherally with a sharp edged flint or a file, and the glass broken apart by smartly tapping or touching the score mark with a hot metal rod. Of the several methods available today, the use of a hot wire loop applied peripherally to the glass piping was selected as being the most rapid and satisfactory.

This procedure comprises deeply scratching a score mark about ¼ in. to 1½ in. long, depending upon the circumference of the pipe, at the point where it is to be separated. A nichrome wire loop is then adjusted around the glass tubing at the score mark, and electric current controlled by a Variac transformer is applied to the wire (Fig. 1). A foot switch is used to turn the heater current on and off. The wire, after being properly located, is held taut, heated to a dull red and held at this temperature for approximately one minute. At the end of the heating period, the current is turned off. When all color fades from the wire it is removed and a damp cloth applied, first to the score mark and then slowly wiped around the heated circumference of the pipe. The resulting strains usually cause the pipe to break clean.

Certain precautions are necessary for the successful severance of the pipe. For example, it is essential that the hot wire make a uniform contact with the surface of the pipe. This is readily accomplished by forcing the hot wire to the glass surface by means of a carbon paddle. The pipe should be well supported, preferably in wooden V-blocks, during the cutting operation.

Making Joints

Joining sections of Pyrex glass tubing in moderate wall thickness is relatively simple and is part of

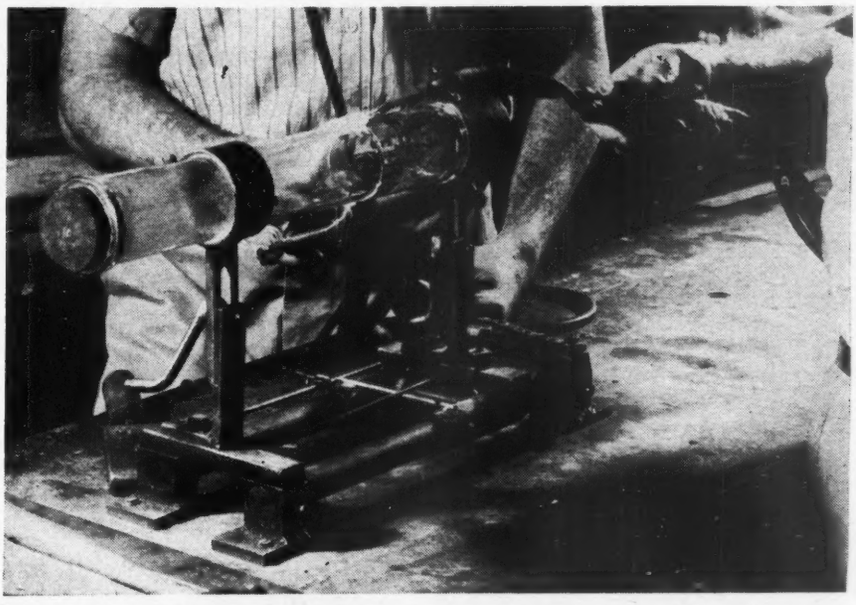


FIG. 2. Welding sections of tubing. As ordinary flame heating is inadequate to fuse thick wall tubing, high-frequency current is used along with oxy-hydrogen torches.

FIG. 3. In order to relieve the strain in the tubing after welding, it is placed in an electric annealing furnace, heated for a few minutes and slowly cooled to room temperature.

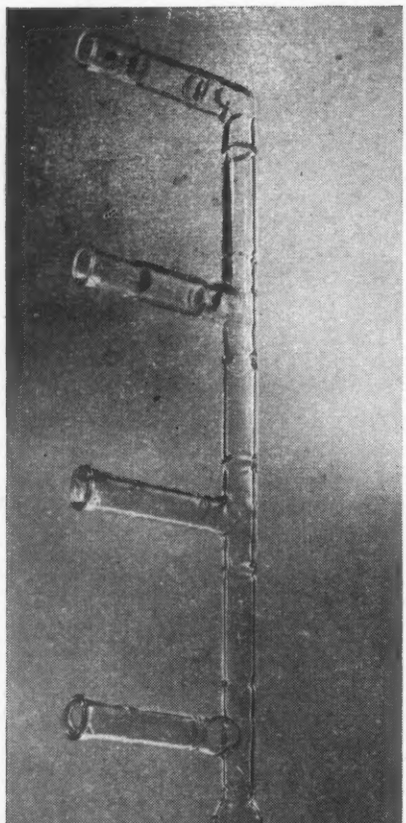


FIG. 4. In the fabricating of this manifold over 70 sequential steps, such as cutting, welding and annealing, were needed.

the knowledge of every chemist and physicist. For such work the heat of any oxy-hydrogen gas flame is adequate. But in sealing thick wall tubing of large sizes, flame heating produces unsatisfactory results, causing outer surfaces to become overheated while the inner surfaces may not attain a high enough temperature to insure a satisfactory joint.

It is recognized that when glass is sufficiently heated it becomes electrically conductive. If high frequency currents of sufficient magnitude are caused to flow through the pipe it will be uniformly heated throughout the wall's cross section and become sufficiently plastic to permit satisfactory fusing. The preheating flame is applied by two standard oxy-hydrogen torches modified by attaching to the tip of each torch a lead from a high-frequency oscillator. The current is conducted to the glass by the active ions in the flame.

The procedure of sealing is, briefly: the two sections of pipe to be joined are mounted in a jig designed to align them axially. The ends are then separated about ½ in. and preheated with an oxy-hydrogen flame until hot enough to become electrically conductive. The two ends of the pipe are brought together and the heating is continued. The high frequency current is caused to flow through the flame and the heated section of the glass until the joint is fused (Fig. 2). The joint is shaped by blowing into the pipe and by stretching it slightly and wiping it with a carbon paddle of sufficient width to bear upon the relatively cold parts of the glass. The joint is then permitted to cool slightly before the piece is removed from the jig and placed within a suitable electric annealing furnace.

Annealing

One of the great advances made in the economic use of glass was the discovery that its brittleness could be overcome by heating to a temperature close to its viscous point and then permitting it to cool without subjecting it to draft until it had reached a temperature approximately that of the ambient air. Relieving strain in glass is of extreme importance, particularly in the installation of long lengths of glass piping that may be subject to stresses incurred by changes of temperature of the fluids passing through, or by handling during installation.

Relieving strain or annealing of a piece of glass pipe or fitting is a simple procedure in most cases. Nevertheless it requires close attention to details. During the process of fusing boro-silicate pipe, severe strains are set up and, should the pipe be allowed to cool quickly to room temperature, it may soon break apart at the point of seal. In order to prevent such breaks, strain relief by annealing is imperative. Annealing is accomplished by heating the joint and the adjacent areas two or more inches beyond each side of the seal in an electric type oven (Fig. 3) for a period of 6 to 12 minutes. The heat is then turned off and the pipe permitted to cool within the oven to approximately room temperature. Frequent rotation of the piece during annealing is recommended. Precautions to be taken are that the heating must be uniform and that the piece being annealed must not be subjected to draft or sudden changes in temperature.

To the unaided eye, a piece of unannealed and highly strained glass pipe appears no different from a piece that is well annealed and strain free. When a piece of annealed glass is viewed through a polariscope, there is little evidence of color. When a piece of unannealed pipe is viewed through a polariscope, however, there appears brightly colored bands indicative of strain. These color bands result from the glass under strain becoming doubly refractive. The frequency and intensity of these colors enable the operator to judge the severity of the strain and the progress of annealing as well as the length of

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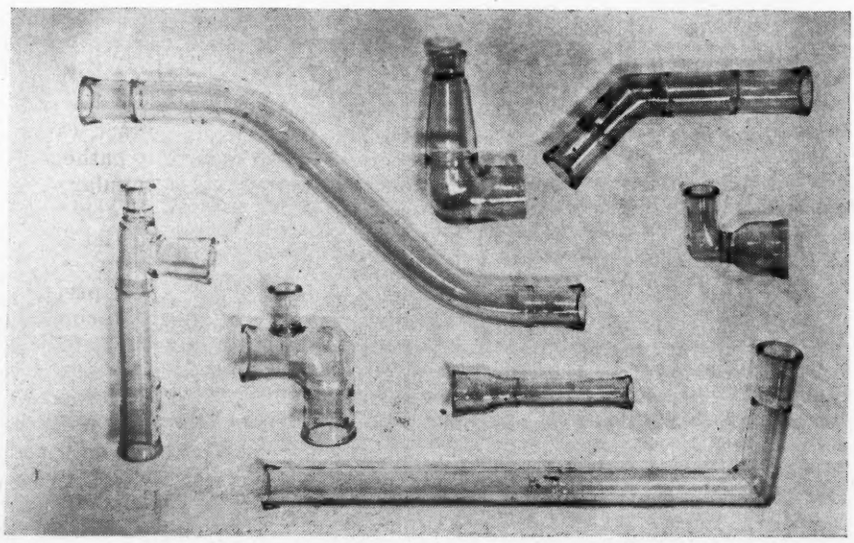

FIG. 5. In the hands of a skilled artisan, there is apparently no limit to the number and complexity of special piping details that may be fabricated from glass tubing.

CANNING DRINKING WATER

One of the biggest little surprises of the war was the difficulty of canning drinking water. Everybody thought it would be easy until it was tried. It involves container and processing problems never met before

By W. J. MUTSCHLER, Manager Packaging Laboratory,
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THERE has always been a need for packaging water in such a manner that it would retain its normal flavor and appearance for extended periods of time. During past centuries, goatskins or wooden casks sufficed as containers for water for desert expeditions or sailing ships that were away from a suitable source of fresh water for many months. In such cases, the flavor and appearance of the water were not as important as having water available to sustain human and animal life.

In wartime especially, water is a critical material, and the outcome of battles may depend on its availability. In World War I, wooden casks and wooden or metal, tank wagons or trucks served to supply the normal water requirements of an army. The soldier carried his emergency supply of drinking water in a metal canteen, which he replenished as he could.

Container Needed

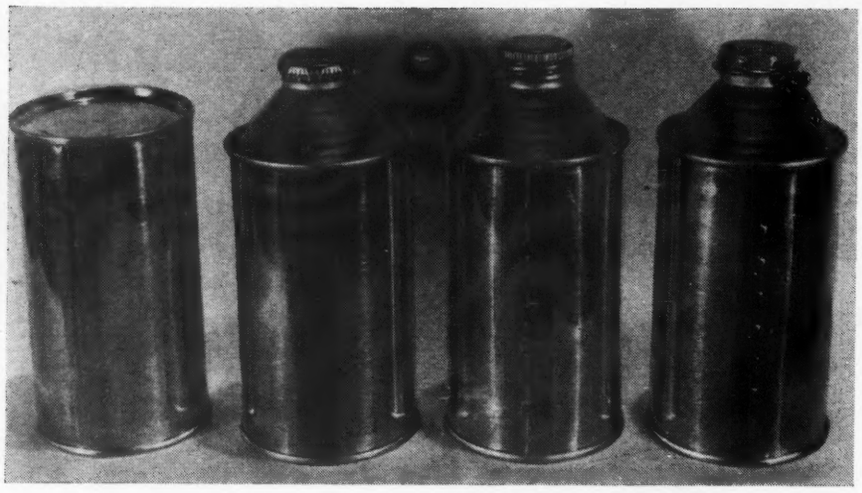
In the faster tempo of World War II, additional means were developed to transport water to the fighting men. Pipe lines were laid from a good source of water to the fighting front, and mobile equipment was fitted with "blitz" cans, each of which held five gallons of water. In addition to these normal methods of supply, containers were developed for packaging drinking water for emergency purposes. These were first used in collapsible rubber life rafts for the Air Forces and later in Navy, Coast Guard, and Merchant Marine life boats. Paratroopers were supplied with these emergency units, and many such containers were dropped from planes to men isolated during a battle or to survivors of a shipwreck or to air casualties. The story of the development of this emergency drinking water can and its possible use in peacetime is one which should interest all food technologists.

Standard oblong emergency drinking water can supplied Army Air Forces during World War II.

To the layman, water appears to be the simplest of products to can in a metal container. It is a constituent of all naturally occurring food products, many of which are canned with ease. However, water promotes rapid rusting of any iron with which it is in contact, can be a medium for carrying pathogenic bacteria, and has the singular characteristic of expanding when freezing. Pure water contains no flavoring elements to hide off-flavors that can be absorbed during its preparation for packaging or during its storage in a container. All of these characteristics make it an extremely difficult material to can satisfactorily in a metal container. As early as 1930, work was carried on in the research laboratories of the Continental Can Co. to develop a suitable metal can for mineral waters or other waters that possess desirable medicinal qualities. It was found that water could be packed in standard packers' cans using high filling temperatures and low head-spaces, but once such cans were opened, the water had to be consumed or rusting would develop very soon. Furthermore, even these cans developed metal hazes in the water, which affected its acceptability. It was not until the beer can was developed that it was possible to satisfactorily pack water in a recloseable container.

Beer Can-type Best

At the time canned beer was first marketed commercially in January, 1935, work had already been started on experimentally packing many beverages other than beer in this type of can. It was shown experimentally that many types of mineral and carbonated waters could be satisfactorily canned in beer cans without any rusting since the beer can linings were specifically developed to prevent any metal exposure. Consequently, when an investigation was started in 1941 at the Northwestern University Medical School by Dr. A. C. Ivy under the auspices of the National Research Council to develop a satisfactory container for emergency drinking water for fliers forced down at sea, the problem did not appear to be insurmountable. In fact, by March, 1942, sufficient experimental work had been completed by Dr. Ivy, in cooperation with two major can company research laboratories, to indicate that either the cap-sealed or flat-top beer can was a satisfactory container for water. More important, a method had been developed for packing the water in cans in such a way that it would be potable after long periods of storage at tropical or arctic temperatures and at very high altitudes. Also, canned water could be subjected to unusually rough treatment and remain intact and potable.



Can types used in experimental work on canning drinking water. Left to right: flat-top beer can, cap-sealed beer can with standard crown cap closure, beer can with screw cap closure, beer can with Kork-N-Seal closure.

A summary of the tests conducted at the Northwestern University Medical School follows:

Cap-sealed Cans

Two types of cap-sealed cans were included in the tests. Both were made of hot-dipped tinplate (1.50 lb. per base box).

Type I—The tinplate was coated prior to manufacture with a modified alkyl-enamel base coat. After assembly, the cans were wax-lined with standard beer-can wax. Both crown caps and screw caps were used as closures. A tin foil spot was used on the cork insert in the crown, and a tin foil facing on a pulpboard backing was used in the screw cap.

Type II—The tinplate was coated prior to manufacture with an oleoresinous enamel base coat, the ends were roll-coated with a vinyl copolymer enamel, and the bodies were spray-lacquered with a similar enamel. The side seams of the bodies were side-striped with a vinyl enamel prior to spraying. The closure used was a Williams Kork-N-Seal with a rubber gasket insert.

Flat-top Cans

Flat-top cans were also made of hot-dipped tinplate (1.50 lb. per base box), base-coated with an oleoresinous enamel. The interiors of the side seams of the bodies were side-striped immediately after soldering, and the bodies were then spray-lacquered inside with a vinyl copolymer enamel. The plate used in the manufacture of the ends was roll-coated with a vinyl copolymer enamel over the oleoresinous base-coat prior to fabrication of the end.

Distilled water was used in all of the preliminary tests conducted at the Northwestern University Medical School. Since all of the experimental cans used were of the proper capacity to contain 12 fl. oz. of beer, fills of approximately 12 fl. oz. of water were used. However, as the tests progressed, it was found that a fill of approximately 11 fl. oz. in this size can was much more effective in preventing distortion during freezing.

Enameled Cans

All of the enameled cans were filled with water that had been sterilized by boiling. The filling temperature used was 200 to 205 deg. F., which was comparable with temperatures that could be maintained in a commercial filler for such a container. The cap-sealed cans having the enameled linings were capped, immediately inverted for 2 or 3 minutes to sterilize the cap, and were then water-cooled.

The enameled flat-top cans were closed under 5 in. of vacuum in a vacuum closing machine. These were also inverted for 2 to 3 minutes after closing and were water-cooled. The resultant vacuum in the flat-top cans was 19 to 21 in. at 70 deg. F. The head-space allowed in both containers was approximately 5/8 in.

Wax-lined Cans

Wax-lined cans were rinsed with sterile water prior to filling. They were then filled with approximately 11 fl. oz. of water that had previously been boiled for 5 minutes. The filling temperature was maintained at approximately 140 deg. F. The cans were than capped and pasteurized in water at 140 deg. F. for 20 minutes and then water cooled. The final vacuum in the cans was 6 to 8 in. at 70 deg. F.

Summary of Results

All of the packages tested were satisfactory from the standpoint of flavor.

In the majority of samples examined, there was little indication of rusting over a storage period of one year, except in those cans that had been severely deformed during freezing tests. There was some indication that slight rusting might develop in the enameled cans, especially along the side seam.

In the initial tests, those cans that were filled at 200 to 205 deg. F. withstood freezing storage at –30 deg. F. for prolonged periods much better than those cans which were filled at 140 deg. F. This performance was later found to result from the fact that the comparative headspaces in the two cans at the freezing point were not the same. When the headspace in the cans filled at 140 deg. F. was increased sufficiently to allow the same volume for expansion as in the other cans, the resistance to freezing of both types of cans was identical.

All cans stood up satisfactorily in an atmosphere comparable to the atmospheric pressure at an altitude of 40,000 ft.

All packs were sterile after storages up to 12 months at room temperature of 98 deg. F.

Field Tests

After the initial work, field tests were made by both the Army and the Navy. Unfortunately, all types of cans were not included in the same test at any one time. All of the cans appeared to be satisfactory in these field tests, although with very rough handling, leakage or a small degree of rusting did develop in as many as 3 percent.

During the course of Dr. Ivy's tests, experiments were also made with plain hot-dipped tinplate open-top cans. By filling such cans with distilled water at a temperature of 200 to 205 deg. F., closing in a vacuum closing machine, inverting to sterilize the cover, and then water- or air-cooling, it was possible to make a very satisfactory pack of water. However, such a pack had two disadvantages: (1) The container once opened could not be reclosed; if some type of reclosure feature were provided, the container would rust rapidly after opening,

and (2) after extended periods of storage, the water became cloudy, apparently due to a colloidal suspension of tin. There was a trace of metallic flavor in the water.

Can For Life Rafts

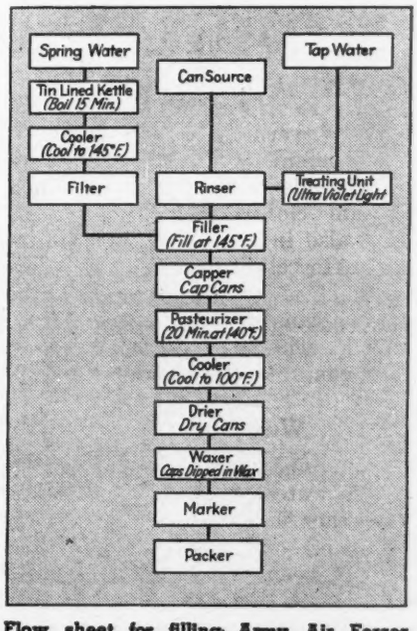
After the experimental work was completed at Northwestern, the problem was thought to be solved as far as the Army and Navy were concerned. However, the Army Air Forces later required an oblong emergency drinking water can for one-man life rafts. Further research was undertaken to develop such a can. To give the ultimate protection at a practical cost, a wax-lined container was employed. It was recognized at the start that the oblong can could never be made as satisfactory for drinking water as a round container. The first experimental packs of the oblong container showed that distilled water caused rusting of the container more rapidly than did a water that was slightly alkaline. This confirmed the results of experiments on other products canned in tin containers in that neutral products having a pH close to 7 are very prone to cause oxidation of any exposed iron in the container. By raising the pH of such a product slightly, it is often possible to reduce the amount of such oxidation and often to prevent rusting entirely. Fortunately, we were able to locate a source of spring water which, after boiling and filtration of the precipitated temporary hardness, had a pH of approximately 8.5 and still had excellent flavor characteristics. The source of supply of this water was unlimited. Since the amount of rusting that developed in the oblong can was negligible, it was decided to go ahead with the packing of this water in the newly developed emergency drinking-water can.

The Continental Can Co. was given the first contract for packing these oblong cans for the Army Air Forces. Originally, it had been intended to fill these cans at various points throughout the country, but because a good supply of water and adequate filling facilities were available through Hinckley and Schmitt Co., in Chicago, Ill., it was selected as the packer of the water. Bacteriological control throughout the entire process was under the supervision of the Continental Can Co. research laboratories. The procedure used in filling the cans at Hinckley and Schmitt is shown in the flow sheet illustrated herein. The final specifications called for a fill of 11 to 12 fl. oz. in a can having a total capacity of 14.75 fl. oz. to avoid damage from freezing.

During the course of the war, approximately 4,000,000 emergency cans were packed for the Army and the Navy. As far as is known, the majority of these cans reached their final destination in good shape, although, due to the type of handling, which is certain to occur in combat areas, some cans were damaged. The plastic screw caps had a tendency to fracture, either during freezing or when given a sharp blow. There were also a few instances of rusting that developed when some cans were frozen and thawed many times. It was the original intention that these cans would be replaced in the seat pack every six months or, at the most, every year so that extreme rusting could not develop. As can well be imagined, however, this replacement was not always possible, and many cans of emergency drinking water were in the seat packs as long as two years or more before they were finally used. Some rusting did occur over this period of time with continued rough handling and freezing and thawing in many cases, but we know of no case where the water in these cans was undrinkable in an emergency.

Supercooling Problem

In the course of this work, a peculiar phenomenon was noticed. If the water in the can is frozen slowly or without any disturbance, it is possible to freeze a cake of ice completely around a center core of supercooled water. "Supercooled water" is water that is cooled below the freezing point without ice actually being formed. As this cake of ice gradually thickens, the greater specific volume of the ice generates terrific pressure, which eventually fractures the cake. When this occurs, a stream of supercooled water is forced from the fracture, freezing as it pushes outward. Because of the rapidity of this freezing and the pressures exerted, anything that is in the path of the freezing column is pushed aside. This can cause opening of side seams, buckling of ends, and, in many cases, leakage. Headspace is no factor if the water in the can is frozen to produce this peculiar result. In several cases, it was found that the fracture developed at the top surface of the ice cake and actually pushed out several inches above the surface of the ice so that the top end was buckled. Fortunately, this phenomenon is rarely experienced with ordinary freezing since there is usually sufficient vibration or minute particles of ice in the water to "seed" the production of additional ice crystals and prevent supercooling.



Flow sheet for filling Army Air Forces emergency drinking water.

As in the case of many other problems, the development of the canning of drinking water was expedited by the requirements of war. The extensive use of canned water by our Army and Navy and the results obtained have proved that the canning of drinking water is practical. The experience gained shows that many mineral or spring waters can be satisfactorily canned in recloseable wax-lined containers without impairment of flavor or appearance. Rusting should not be a problem with containers supplied for domestic use since they will not be subjected to rough handling and severe temperature conditions. Round cans are recommended, rather than oblong cans, since shape would not be a serious problem in domestic use. In round cans, the area of iron exposed to the water would be practically nonexistent as it is in the present round beer can. Highly alkaline waters cannot be canned satisfactorily since they would have a tendency to soften the wax or the enamel beneath the wax during extended storage periods. It is not unlikely that in the future, exacting consumers may be able to obtain their favorite spring or mineral water in cans direct from the source of supply.

Packing Plant Sanitation Calls For Good Housekeeping*

Here is a discussion of sanitation and good housekeeping in meat-packing plants. It stresses the importance of speedy production operation, tells about clean-up work, and how to destroy pests and their breeding places

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SANITATION in meat-packing plants, as in the home or in any branch of the food industry, embraces the elements that constitute good housekeeping.

Good housekeeping begins with a good house. This means that certain physical or structural requirements must be met. Before any packing house goes into operation, all plans must be approved by the Meat Inspection Division of the Department of Agriculture.** Since the detailed requirements of M.I.D. are available to anyone interested, they are merely mentioned here. These requirements are specific and cover such details as: (1) proposed water supply, (2) minimum slope of floors for drains, (3) number of drains for a given area, (4) number and type of windows, (5) locker and lavatory facilities based on the number of people to be employed, (6) rate of speed at which conveyor chains will operate with reference to the number of animals being processed, (7) number of people employed, and (8) number of inspectors assigned to the operation. This inspection service also covers the type of clothing worn by the various operators and the frequency of laundering clothing, as well as all tools, equipment and ingredients used in the preparation of meats and meat products.

Sanitation becomes a problem in a correctly designed and constructed plant only after operations begin. Since the plant is built to be operated, one's sanitary problems are not to be solved by keeping a plant empty and idle.

Once raw materials and the necessary personnel for their handling enter a plant, constant vigilance must be practiced to keep the plant clean. Such vigilance includes removal and destruction by various chemical and physical means of factors contributing to unsanitary conditions.

Since "chemical means" deal with detergents such as soaps, solvents and emulsifiers, it could justify a report in itself. This article will emphasize the "physical means."

Frequent Cleanups

Frequency and type of cleaning are governed by the nature of the operation. No department receives less than a daily cleanup at the end of a day's operation. The bacon slicing, margarine printing and packaging departments, for example, are kept in order by janitors and clean-up men during rest periods. They remove waste wrappers, clean up conveyors and empty waste cans. If indicated, operating areas are sprayed with a sodium hypochlorite solution.

Open garbage receptacles outside plants attract flies, rodents and other pests.

Cleaning Equipment

Equipment, such as trucks, various containers, trays and molds are frequently covered with light films of blood or albuminous exudates from meat. Preliminary rinsings with tepid or cool water avoid coagulation and formation of water-insoluble protein films similar to those occurring in a milk plant.

Dry-curing boxes represent a very difficult cleaning problem. These are rectangular metal boxes, holding 600 to 650 lb. of bacon bellies and dry-curing mixtures. Curing ingredients are applied to the bellies in dry or granular form. Brine-soluble proteins are extracted from the meat. Rinsing does not remove these proteins completely. Consequently, they form insoluble films inside the curing boxes. These boxes are frequently made of galvanized black iron, which does not simplify the cleaning problem. Many detergents and soaking vats have been used with varying degrees of success. Periodically, power-driven metal brushes must be employed to burnish off the accumulated water-insoluble protein residues. To date, no substitute has been found for mechanical removal of the accumulated protein material. Frequent and thorough cleaning of protein-coated equipment will help to control a persistent sanitation problem in the curing department. In setting up a sanitizing program, it is essential to consider many factors, including volume of equipment handled, available manpower and general economies of the operations.

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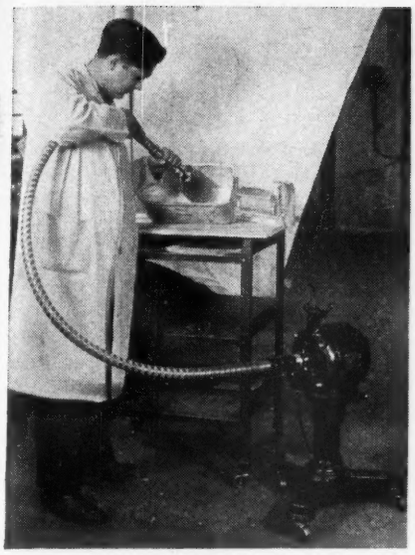
* Based on paper on program of Chicago Section IFT., 1946 panel session, Chicago Production Forum, sponsored by Chicago Technical Societies Council.

** Meat Inspection Division, U. S. Department of Agriculture, Bulletin, GPO-WFA No. 374.



Using a power-driven brush for mechanical removal of films on boiled ham molds.

Rapid Operations Important

In meat packing plants, the operations of removing the hide, eviscerating, showering the carcass and transporting the carcass to hanging cooler must be conducted as expeditiously as possible. Speedy handling means more than meticulousness. Extreme care might be of considerable merit from an esthetic viewpoint, but it would not result in the production of cleaner products. This does not mean that animal carcasses should be "slapped through" an operation with emphasis only on speed of handling.

Sufficient water is used in the preparation of meat products to justify the remark that "they appear to be floated to market." Washing or rinsing water must comply with Treasury Department standards for potability. These standards are employed in the sanitary control of drinking and culinary water supplies used on interstate carriers.

Cleaning operations and sanitary measures selected, depend upon the nature of the department. Some departments are dry; others are moist. In the smoked meat department, smoke alleys and smoked-meat hanging coolers, are very dry. In contrast, the curing cellars or sausage-emulsion curing rooms are very wet.

Floor Sanitation

Hams and bacon from smoke chambers are quite free from mold spores. They have on their surfaces, however, liquid and semi-liquid fat, which drips on the floor. This creates a safety and sanitation problem. Sawdust is sometimes used on the floor in these departments for safety reasons. It has good absorptive properties and is cheap enough to permit frequent replacement. But it has its disadvantages. Most commercial sawdusts harbor mold spores. Dust arising from such floors contaminates the product. Contamination is reduced when fine salt is used in place of sawdust on the floors of such departments.

There is, however, no substitute for sawdust in carcass-meat coolers. It is the only substance capable of absorbing blood readily. Sawdust was first used by the small butcher shop. Use in most major packing plants followed. Many packers have experimented with methods for sterilizing sawdust. If any have succeeded to date, its success is kept a trade secret.

In meat coolers, low temperatures and expeditious handling are relied upon to prevent undue mold growth. Expensive cuts are exceptions. Here trimming costs can be absorbed in the price of the cut.

Presence of insects and rodents in a meat processing plant, as in any food processing plant, is undesirable. Insect fragments, excreta of both rodents and insects, and rodent hairs constitute filth in the sanitary appraisal of a food establishment by regulatory and inspection agencies. With this in mind, nothing short of complete elimination of insects and rodents can be considered satisfactory. Such an objective cannot be attained by sporadic and infrequent drives or campaigns. Complete and permanent control of pests demands the installation of a thorough, well-studied and well-executed program. It must be in constant operation and a part of the day-by-day overall sanitation program.

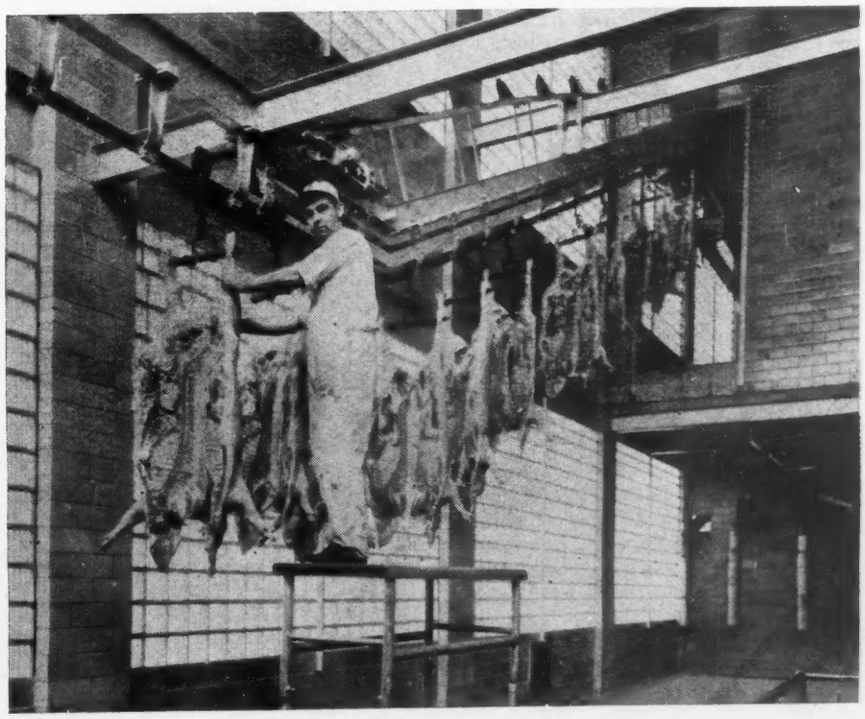
Pest Control

Pest control program in a meat processing plant is built upon the following:

1. Elimination of breeding conditions outside the plant.
2. Rodent- and insect-proofing of plant buildings.
3. Elimination of breeding conditions within the plant.
4. Destruction of pests within the plant.

Each step is an integral part of the program that must be executed perfectly if the program as a whole is to succeed.

Insect and rodent control begins outside the plant. Too much is expected of the control program within the plant if swarms of insects and rodents are permitted to exist and breed just outside the plant. All sources of insect and rodent infestation outside of the plant must be located and cleaned



View showing a modern, well-lighted and sanitary meat-packing plant. Smooth, non-corrosive tile walls and glass block windows simplify daily cleaning operations.

Windows like these permit the entrance of insects and rodents into meat plants.

up. Precautions must be taken to prevent possible recurrence of infestation. Normal cleanup of the premises outside of the plant removes conditions favorable for pest breeding. At times conditions arise, either by accident or oversight, that create danger spots. Frequently, inedible byproducts, trucked to points outside the supervised and inspected premises, drop to the ground unnoticed. Such conditions attract rats and insects. Occasionally waste residues contaminate grounds outside the plant. During warm weather these residues will serve as culture medium for flies. Treatment with lime, borax or other larvicides, is required. Manure in animal holding pens and runways breeds flies. Daily removal is essential. Rubbish, garbage and other waste should be removed daily and not allowed to accumulate. Boxes, barrels, lumber and discarded equipment must not be stacked against the building to provide shelter for rats.

Making buildings as tight as possible against the invasion of rats and mice from the outside is, perhaps, the most logical and effective step in the control program. Meat processing plants attract pests. Conditions favoring the multiplication of pests are found in all food plants. Pests will make every effort to gain entrance, which must accordingly be made as difficult as possible. Good pest-proofing will reduce time, expense and inconvenience of poison baits, traps, fumigation and insecticides.

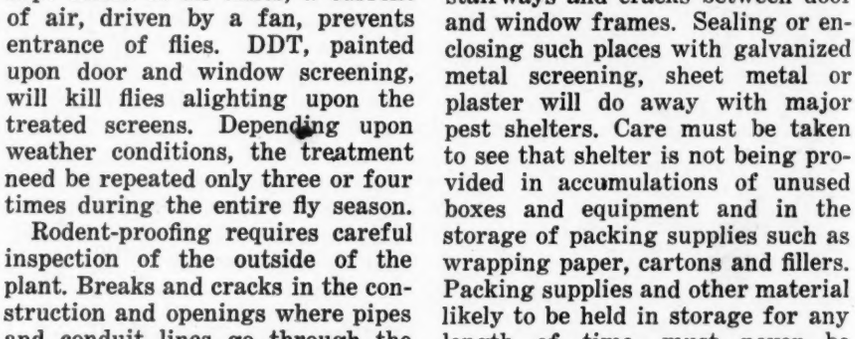
Insect-proofing is primarily the exclusion of flies, mosquitoes, gnats, moths and other flying forms by means of tight-fitting windows and door screens. Door screens should open outward. Window screens should be full length. Both types of screens should be at least 16-mesh. All screens must be constantly checked for breaks and maintained in perfect condition. Electrified screens, if properly constructed, are of some value but they are easily broken and are relatively expensive. Their use is limited in this industry. Where screen doorways cannot be kept closed at all times, a current of air, driven by a fan, prevents entrance of flies. DDT, painted upon door and window screening, will kill flies alighting upon the treated screens. Depending upon weather conditions, the treatment need be repeated only three or four times during the entire fly season.

Rodent-proofing requires careful inspection of the outside of the plant. Breaks and cracks in the construction and openings where pipes and conduit lines go through the walls must be sought. Such places should be filled in with concrete mortar. Ventilators, drains and sewer openings must be effectively screened with 16- to 18-gage galvanized wire cloth. Doors should be fitted with 24-gage galvanized sheet-iron flashing. The roof must be tight. Regular inspections must be conducted to detect and seal any new entry-ways likely to occur as a result of the work of plumbers, electricians and other workmen.

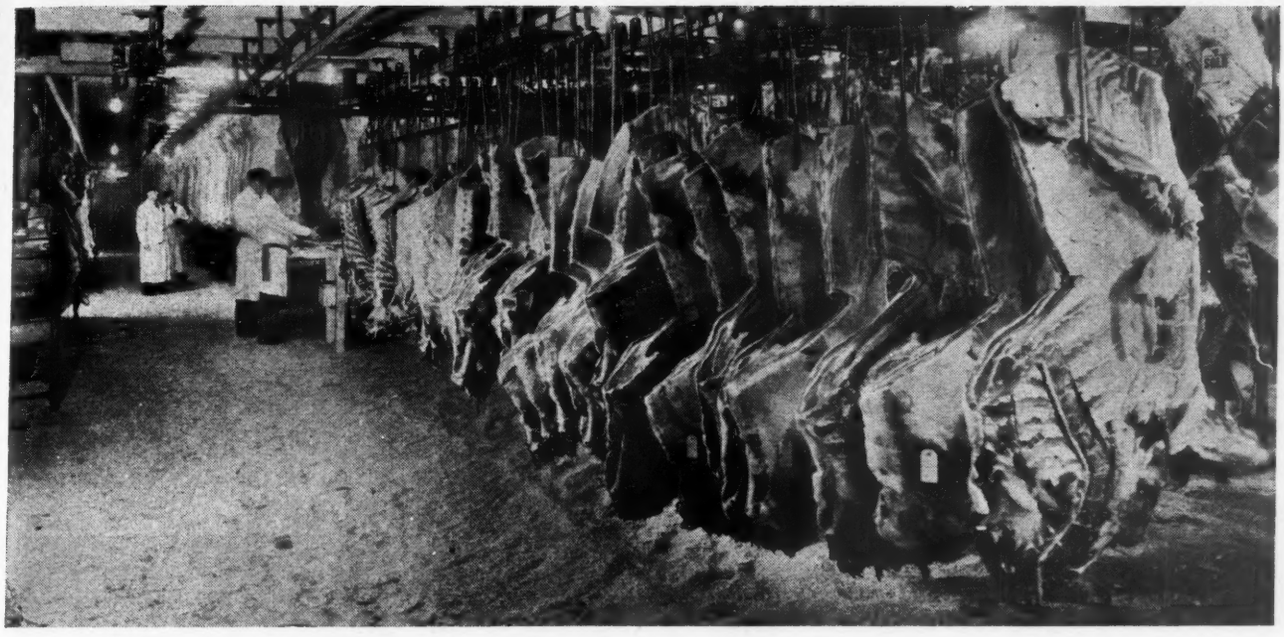
Breeding Conditions in Plant

Continued presence of insects and rodents in a plant indicates that adequate food and sheltered places exist. Good housekeeping requires the removal of food materials for insects and rodents from floors, cracks, crevices and equipment. Dark, moist, and sheltered spots should be eliminated. Regular and systematic inspections, particularly in out-of-the-way spots, often reveal new and potential breeding areas.

Rats, mice and cockroaches find shelter within certain favorable structural systems, such as attics, double walls and ceilings, ventilating units, areas under floors and stairways and cracks between door and window frames. Sealing or enclosing such places with galvanized metal screening, sheet metal or plaster will do away with major pest shelters. Care must be taken to see that shelter is not being provided in accumulations of unused boxes and equipment and in the storage of packing supplies such as wrapping paper, cartons and fillers. Packing supplies and other material likely to be held in storage for any length of time, must never be stacked against a wall or flat on the floor. Ample cleaning room must be provided between the stock and the walls. Platforms, at least 12 in. high, should be used to elevate the



Where ventilation is desired, insects are excluded by tight-fitting box screens. They should permit maximum opening of windows, as shown where screen is removed.



There is no substitute for sawdust in carcass-meat coolers. Commercial sawdust, used on the floor of meat coolers, absorb blood and prevents accidents. It is cheap enough to permit frequent replacement.

stock and to facilitate cleaning of the floor. Edible stocks, not under refrigeration, should be stored in containers with tight-fitting tops or lids.

Pest Destruction in Plants

Destruction of pests within the plant can never be considered as anything more than a temporary measure. Strictly speaking, destruction of rats, mice and insects in the plant should be required only for those pests that accidentally gain entrance through a break in the insect-and rodent-proofing measures in the plant. As previously pointed out, spending time, money and labor to kill a few rats and insects within the plant is illogical when they are replaced a hundred times over by new infestations, which have only to run or fly into the unprotected plant. This viewpoint is also held by M. I. D. officials. They contend that the industry tends to measure the success of vermin control by the numbers of rats, mice and insects trapped or killed, whereas the criterion of effectiveness should be scarcity rather than abundance of the kill. Destruction of pests within the plant is accomplished by means of chemical insecticides, poison baits and traps. Chemical destruction of pests within government inspected plants is under close supervision of the MID. They permit only approved methods and materials. Permission must be obtained from the local inspector each time chemical sprays, fumigants or poison baits are to be used. No condition, which may be a source of danger to human health or which is not consistent with proper sanitation, is tolerated.

Hydrocyanic acid gas fumigation is permitted by the MID, but this gas is so toxic to man that very few packer make use of it. It is absorbed by some products and requires a long ventilation period after treatment. In some cases, when pest populations have built up to such an extent that they cannot be brought under control by any other method, HCN is employed as a last resort. Professional exterminators should be engaged whenever the use of fumigants is necessary.

Chemical Insecticides

Kerosene solutions of pyrethrum, organic thiocyanates, rotenone and DDT may be used in the elimination of insects, providing exposed meats are first removed and premises thoroughly washed after completion of operations. Sodium fluoride, powdered pyrethrum, derris root, borax, powders containing organic thiocyanates or DDT in an inert base may be used for the elimination of roaches under the same restrictions governing the use of sprays. Sodium fluoride powder must be colored blue or green. Sprays are used much more frequently than dusting powders. Operators, applying sprays, are encouraged to wear a respirator, gloves and clothing that will prevent contact of the chemical with the skin.

Sprays containing pyrethrum are best suited for the control of the two most common packing house insects—flies and roaches. Pyrethrum sprays have the desirable characteristics of an immediate knockdown of the insect and only very slight toxicity to man. These sprays, however, must come in direct contact with insects in order to be effective. Pyrethrum sprays contain a minimum of 0.20 percent pyrethrins. They are atomized by power sprayers and driven into cracks and crevices. Contact with the sprays drives insects out of their hiding places into the open. If a sufficient amount of the spray comes in contact with insects, they die. Pyrethrum is also used as a space spray to control flying insects.

Use and application of DDT as an insecticide in inspected meat packing establishments is new and, at the moment, is not generally practiced. Chief value of DDT lies in its unusual residual activity. It is not necessary for the spray to hit the insect. Deposition of a fine film of the DDT crystals upon surfaces over which insects walk, crawl or rest is all that is necessary. The insect absorbs the toxicant through its appendages, is paralyzed and eventually dies. This mode of killing is much slower than that of pyrethrum, but is compensated for by the extended period of its lethal effectiveness. In some

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Portable Container Used For Shipment of Frozen Food

Shipment of frozen food to small buyers is a big problem confronting processors and distributors. The solution is a dry ice-refrigerated container. It maintains low temperatures and prevents any defrosting

By JOHN V. ZIEMBA, Assistant Editor, "Food Industries"

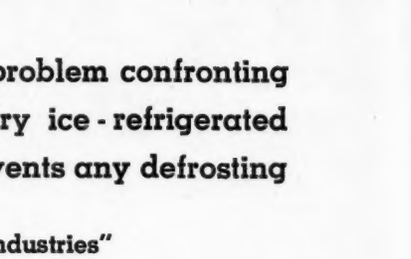
IN many instances, processors and distributors must ship frozen food direct to small buyers. Small buyers such as retail stores, department stores and locker plants are unable to accept freight carload or truckload lot shipments. Facilities must be provided to maintain LCL and LTL (less than truck load lot) shipments in a frozen state so as to offset product spoilage.

Several types of containers for LCL and LTL shipments are now on the market. These are shipped either by truck or Railway Express. Where short hauls are made, refrigeration frequently is not employed. Generally, however, insulated truck bodies are used. In instances where longer hauls are made, trucks are refrigerated either mechanically or by means of dry ice.

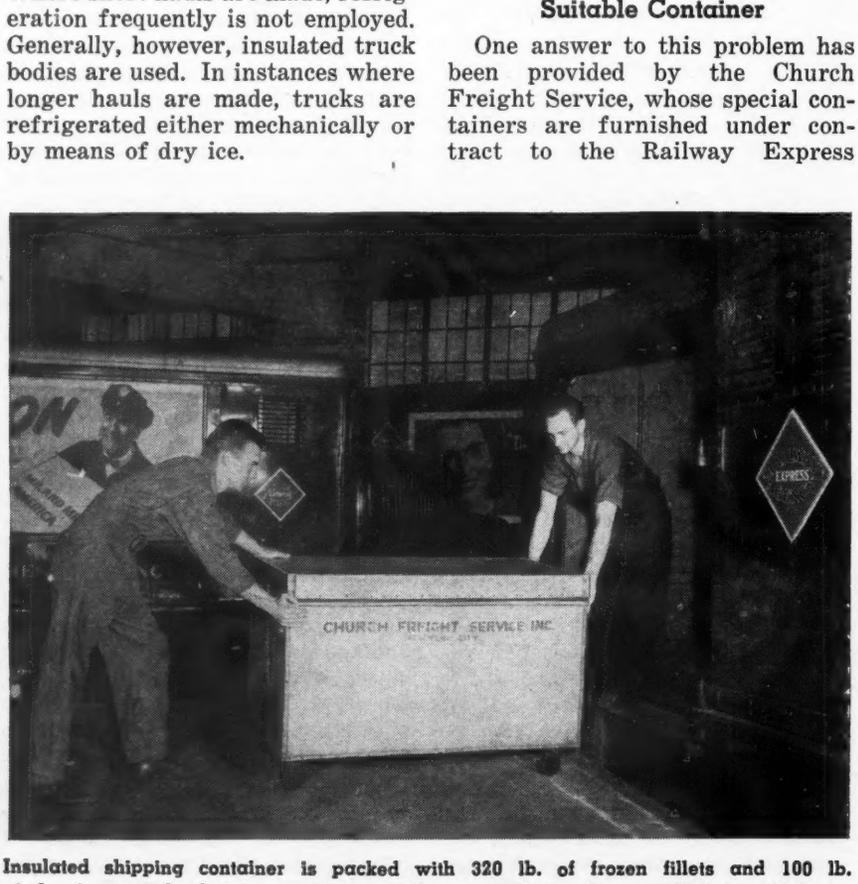
Trucks operate on established routes and are unable to reach all consignees. Consequently, containers must be provided that can be refrigerated with sufficient dry ice to maintain products in a frozen state until they reach off-the-route points. Such containers should not need re-icing. Products, during shipment, must remain in a frozen state from one to five days or more. Accordingly, the amount of dry ice required depends on the length of the trip and the prevailing temperature.

Suitable Container

One answer to this problem has been provided by the Church Freight Service, whose special containers are furnished under contract to the Railway Express Agency, which supplies them under regularly published tariff rates. No charge is made on the tare weight of the container. Express charges are based on the regular LCL rate for the weight of the shipment. A service charge of $3.00 is assessed on shipments for the first 48 hours in transit. An added charge of $0.50 is made for each additional 24 hours between terminals. Service charge is for the use of the container and includes delivery to shipper and collection from the consignee. A 24-hour grace period is provided for loading and unloading. The consignee may keep the container as a temporary refrigerator for a small charge. When the consignee is finished with the container, he notifies the express agency. After each trip empty containers are washed and cleaned by the express agency.



Shipment of shrimp from a Louisiana port arrives in New York in a frozen state.



Insulated shipping container is packed with 320 lb. of frozen fillets and 100 lb. of dry ice and loaded into a Railway Express truck for East to Midwest shipment.

Container Construction

Refrigeration engineers of General Electric Co. designed and developed the container as a result of extensive studies and experiments.

It has a net capacity of 10 cu. ft. When the refrigerant bunker is removed, the capacity is increased to 12 cu. ft. Inside dimensions are 44½x22x20½ in. The refrigerant bunker measures 21x11x11 in. The framework is covered inside and outside with thin sheet steel. Fiberglass insulation is used. Containers are mounted on casters to facilitate handling.

Experiments With Frozen Fish

Tests were made recently by the writer to determine the general suitability of the container for frozen fish fillets. Nineteen master cartons, containing 17 1-lb. packages of fillets per carton, were loaded into the container with two 50-lb. bricks of dry ice. Thermocouples were fixed in five sections of the container and connected to a Leeds & Northrup potentiometer. The container was locked and rolled out to the south side of a shipping dock where it was exposed to the sun. Temperatures recorded periodically outside the container and in five sections within the container are given in Table 1. After 90 hours the container was opened, fillets were examined to ascertain if any defrosting had taken place and any residual dry ice was weighed.

Experiments With Frozen Meats

Similar tests were also made to ascertain the suitability of these containers for shipment of frozen meats. The container was held overnight in a cooler prior to packing frozen meats and dry ice in it. A total of 280 lb. of frozen meat with internal temperatures of −20 deg. F. were packed into the container together with 90 lb. of dry ice. Frozen meats consisted of: (1) 40 lb. beef livers, (2) 30 lb. calf sweet breads, (3) 30 lb. veal kidneys, (4) 25 lb. beef hearts, (5) 25 lb. pork sausage links, (6) 50 lb. beef kidneys, (7) 50 lb. oxtails and (8) 30 lb. sliced veal rib chops.

Thermocouples were inserted in five varieties of meat prior to freezing so that the internal temperature of the meats could be recorded when packed in the container. The thermocouples were placed in five different locations within the container and connected to a potentiometer. Temperatures, taken periodically under the following conditions, simulating shipping and distribution, are given in Table II: (1) Four hours at room temperature to simulate dock loading conditions; (2) six days in a cooler to simulate maximum shipping conditions in a refrigerated car and (3) one day at room temperature to simulate unloading and distribution. At the end of the test, the meat was examined to see if defrosting occurred. The remaining dry ice was weighed.

Frozen lake fish are shipped from Chicago to New York's Fulton Fish Market in a dry ice-refrigerated container that maintains sub-zero temperatures.

TABLE I—Internal Temperatures in Containers Packed With Frozen Fillets and Refrigerated With Dry Ice

Time (hr.)	Outside temp. (deg. F.)	Bottom side (deg. F.)	Center side (deg. F.)	Top side (deg. F.)	Bottom center (deg. F.)	Top center (deg. F.)
1/2	+68.0	−1.0	+9.5	+14.0	−50.0*	−50.0*
5	+71.0	−1.0	+8.0	+23.5	−20.0	+14.5
20	+64.0	−14.0	−5.0	+11.0	−33.0	+7.5
24	+75.0	+2.0	+2.0	+16.0	−30.0	+8.0
30	+73.0	+2.5	+2.0	+15.5	−26.0	+16.0
44	+70.0	−3.0	−1.0	+9.0	−40.0	+9.0
52	+72.0	−2.0	−1.0	+9.0	−36.0	+12.6
80	+67.0	+2.0	0	+12.0	−25.0	+14.0
90	+77.5	+5.0	0	+15.0	−22.0	+15.0

* Potentiometer unable to record temperatures below −50.0 deg. F.

TABLE II—Internal Temperatures of Frozen Meats Packed in Container and Refrigerated With Dry Ice

Storage period (hr.)	*Storage condition	Bottom, left (deg. F.)	Top, left (deg. F.)	Left, center (deg. F.)	Top, center (deg. F.)	Right, center (deg. F.)
0	Start of experiment	−20	−20	−20	−20	−20
4	4 hours at 65° F.	− 7	− 6	−17	− 8	− 2
7	3 hours at 38° F.	− 2	+ 1	− 8	− 2	0
25	21 hours at 38° F.	− 4	+ 2	− 6	− 1	+ 2
28	24 hours at 38° F.	+ 1	− 1	0	+ 2	+ 6
33	29 hours at 38° F.	+ 7	+ 8	+ 4	+ 4	+ 4
97	93 hours at 38° F.	+ 2	+ 7	+ 6	+ 8	+ 8
100	96 hours at 38° F.	+ 2	+ 6	+ 4	+ 6	+ 5
105	101 hours at 38° F.	+ 8	+ 8	+ 4	+ 6	+ 6
121	117 hours at 38° F.	+ 5	+10	+ 6	+ 6	+ 6
145	141 hours at 38° F.	+16	+22	+22	+22	+22
169	24 hours at 66° F.	+29	+32	+30	+30	+30

* Container and frozen meats held for a total of 28 hours at room temperature (65°–66°F.) and 141 hours in a 38° F. cooler.

Low Temperatures Maintained

These tests indicated that the containers can be satisfactorily used for LCL and LTL shipments of frozen fish fillets and meats. A total of 322 lb. of frozen fillets and 280 lb. of frozen meats were maintained in a frozen state for 90 hours and seven days, respectively, when refrigerated with about 100 lb. of dry ice. Approximately 1 and 4 lb. of dry ice remained in the refrigerant bunker at the conclusion of tests with frozen fillets and meats, respectively. It was estimated that the frozen fillets could have been maintained in a frozen state an additional 12 to 24 hours without reicing.

Temperature findings in Table I were extremely interesting with frozen fillets. The highest temperature recorded during the 90-hour period was after the fifth hour

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Utilization of Cooling Towers In the Food Industries

Where large quantities of water are needed for cooling, as for hot cans after sterilization, cooling towers usually effect marked savings. This is a discussion of their use in the canning and condensing industries

By EDWARD SIMONS, Consulting Engineer, San Francisco, Calif.

IN the food industries, heat is applied to many products during processing. In most instances, this heat must be removed later by a cooling process. Thus, in the case of canning, it is essential that the can and its contents be cooled immediately after sterilization so that cooking may be arrested and controlled. When concentration is accomplished by boiling in vacuo, cooling water must be supplied to the condenser in which the vacuum is developed. The temperature of milk must be reduced quickly after the proper period has elapsed under the upper temperature conditions of pasteurization.

In the expanding frozen food industry, preservation is accomplished by freezing and distribution in the frozen state. The natural heat in the product must be removed by refrigerating machines. Because the temperatures of environments are above the temperatures of the refrigerators heat must be removed from them. Compressors are used as heat pumps to raise the temperature of the refrigerant to a point where available natural cooling mediums will subtract heat. In some cases, heat of fermentation is satisfactorily controlled by the use of water as the coolant.

The vehicles commonly used to remove heat are air and water. Air alone is generally unsatisfactory. Since the rate of heat exchange to a gas at the contact surface is relatively low, the volume of air that must be moved is relatively great, owing to its low heat capacity and its low density. Of course, there are some processes in which air is the ideal means for the removal of heat. On the other hand, water has a high heat capacity, the ratio to that of dry air being 1.0/0.24, or practically 4 to 1. At one atmosphere pressure and 70 deg. F., 1 cu. ft. of dry air weighs 0.075 lb., while 1 cu. ft. of water under the same conditions weighs 62.3 lb. Even under conditions of free convection at moderate temperature differences, the rate of heat exchange to water from a contact surface may exceed, by many times, the rate of exchange to air under forced convection at very high velocities.

Water For Cooling

Man, then, has naturally come to consider water as the ideal vehicle for heat removal. With increasing demands for industrial cooling, however, and with requirements for cooling invading arid and desert areas, plentiful water is not always available. Water from a river, lake, or ocean may not exist where needed. Wells may be possible, but at investment and operating costs that are not economical; and, wells are subject to variable water table and to failure. Again, water may be available on a purchase basis. If such purchased water must be wasted, the operating expense should be viewed with suspicion.

The ancient Egyptians[1] produced thin sheets of ice by exposing shallow pans of water to the action of the night air. The wick-like desert water bag and the porous, baked-clay olla of Spanish America are used to cool water by evaporation. The water-cooling tower[2] is an apparatus in which recirculated water may be cooled both by evaporation and by the exchange of sensible heat from water to air.

Cooling Tower Theory

The molecules in water are considered to be in a state of rapid motion[3a] with a mean velocity depending on the temperature of the water. Some molecules at the surface are able to escape from the water because their velocities are

Nomenclature

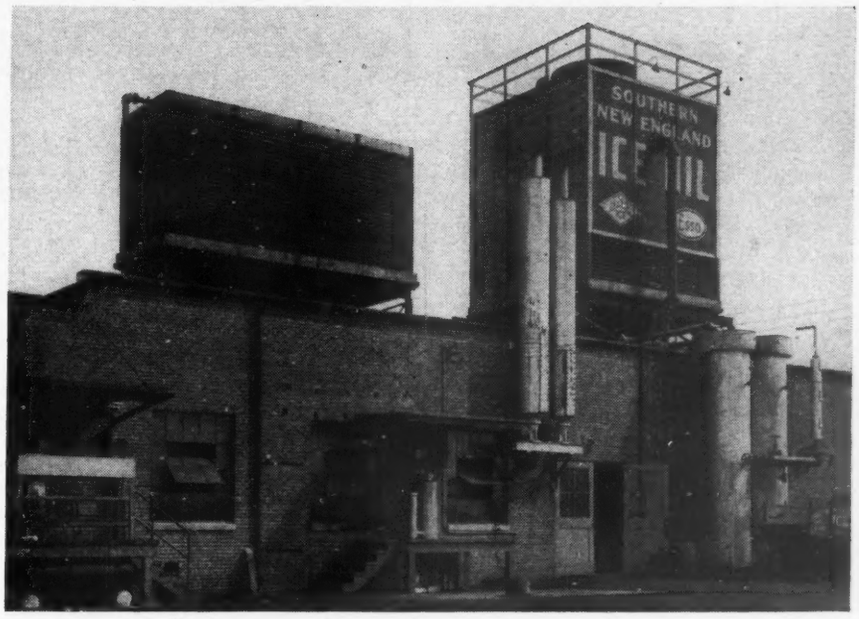
C	= $C_2 - C_1$, decks.
C_1	= Reading on C scale in Fig. 3 corresponding to T_1, decks.
C_2	= Reading on C scale in Fig. 3 corresponding to T_2, decks.
F	= Loading, g.p.m. per sq. ft. of active horizontal tower area = g.p.m. over tower divided by product of active width times active length.
f	= Correction factor for cross flow (Table II), dimensionless.
h_s	= The heat content of exhaust steam entering condenser from vacuum pan, B.t.u. per lb.
m	= Factor determined from Fig. 5, sq. ft. per g.p.m. and deck.
MTD	= Logarithmic mean temperature difference, deg. F.
N	= Number of splash decks in atpheric cooling tower.
Q	= Water flow through can cooler, g.p.m.
r	= Factor determined from Fig. 4, sq. ft. per g.p.m. and deck.
t_c	= Temperature of can after cooling, deg. F.
t_e	= Temperature of exhaust condensate corresponding to condenser vacuum pressure, deg. F.
t_s	= Temperature of can sterilization, deg. F.
T_1	= Temperature of water off cooling tower or onto cooler, deg. F.
T_2	= Temperature of water onto cooling tower or off cooler, deg. F.
V	= Wind velocity factor based upon velocity of approach of broadside wind.
w_s	= Weight of exhaust steam condensate through condenser per unit of time, lb.
w_w	= Weight of cooling tower water to condenser per unit of time, lb.

sufficiently high to project them beyond the free surface of the liquid. As this molecule escape continues, some of the vaporized molecules strike the surface of the liquid from which they emanate, and again become a part of it. When the number of molecules reentering the surface is just equal to the number leaving it, a balance is established between the two phases. The molecules that finally occupy the space above the liquid in a container exert a pressure on the walls of it, called the vapor pressure at the temperature of the water in the container. If the space surrounding the water is filled with air, at a pressure not materially exceeding one atmosphere, the voids between the particles are sufficiently large to allow the vaporization phenomenon to take place undisturbed.

As water molecules are projected into an air stream, in which the partial pressure of the water vapor is less than that corresponding to the temperature of the water, the vaporized water is carried away. The molecules that are projected into the air stream are those having the greater amount of energy. Thus, the mean kinetic energy of the water is reduced, with a consequent reduction in the temperature.[3b]

If the air is saturated, but at a temperature below that of the water, evaporation will continue, since the vapor pressure of the liquid water exceeds that of the water vapor in the air stream. Thus, when water boils in air, the escaping molecules maintain a pressure of their own, equal to the atmospheric pressure. Evaporative cooling will continue in saturated air as long as the water temperature is above the temperature of the air stream.

Cooling also occurs during the exchange of sensible heat between air and water. This exchange is accomplished by conduction and convection. The total cooling action between air and water is then a combination of cooling by evaporation and by the exchange of sensible heat. If the surface of the bulb of a thermometer is kept wetted with the water held in an efficient wick, and if the air is passed over the bulb at an appropriate velocity (approximately 1,000 ft. per minute),[3c] the thermometer will indicate the wet-bulb temperature. This temperature is the lowest to which water may be cooled in air.



The two common types of cooling towers are shown in the above photograph: (Left) Atmospheric tower that must be placed broadside to the wind for greatest efficiency, and (Right) Induced-draft type, in which the air is exhausted from the top of the tower by the fan shown. In this installation, the atmospheric tower is used to cool water for diesel engines that drive refrigeration machines. The forced convection tower cools water for the ammonia condensers. Courtesy of The Marley Company, Inc.

The operation of a cooling tower is based upon the temperatures of water and the wet bulb; the temperature of the air (dry-bulb temperature) does not enter into the design equations. An apparatus of infinite size would cool to the wet-bulb temperature. Industrial cooling towers cool to temperatures that generally range from 4 to 20 deg. F. above the wet-bulb. The temperature difference between the wet-bulb and the final tower water temperature is known as the "approach to the wet-bulb."

Evaporative Cooling

If a drop of water (shielded from radiation) is at a temperature above that of the air, it will be cooled both by evaporation and by the exchange of sensible heat. When the temperature of the water reaches that of the air (dry-bulb temperature), evaporative cooling will continue provided the air is not saturated. The rate of cooling will be retarded, however, since the flow of heat from the warmer air to the cooled drop of water will tend to offset the cooling due to evaporation. When the rate of cooling by evaporation is just equal to the rate of heating by the air, due to the flow of sensible heat, no further reduction in temperature will occur, and the final temperature of the cooled drop of water will be that of the wet bulb.

In Fig. 1, an analogy is presented between heat balance in a cooling tower and weight balance on a scale. If the water rate or the water temperatures are varied, balance must be restored by adjustment of the factors shown on the left-hand side of the scale.

Of these factors, the driving force is a function of the difference between the temperature of the water and the wet-bulb temperature of the air in contact with the water. The wet-bulb temperature increases as heat is added to the air; this increase occurs even though no moisture is added. Thus, as air quantity is decreased for a given heat removal, the final wet-bulb temperature is increased, although the wet-bulb temperature of the air entering the tower is constant.

The rate of heat exchange in a cooling tower varies directly with the extent of the surface of the water film.[2, 4] Although water surfaces of cooling towers are developed in several manners, each type of surface is found in the rain cycle. Rain falls through the air in drop form; waters that have fallen as rain appear on the surface of the earth in sheet form. The heat-interchange surfaces of cooling towers are either drop surfaces or sheet surfaces. Combinations of both types are sometimes used.

The heat exchange in spray towers occurs through surfaces of

tiny drops of water, which are formed by the action of nozzles and similar devices. The instantaneous sum of the surfaces of all of the drops is the instantaneous surface area of a tower. The principal cooling action takes place near the nozzles of the spray tower, where the high velocities of the drops develop a high coefficient of heat and vapor exchange. In some "mist" towers, surface is generated by the use of horizontal decks of screen placed one above the other. The water is "sliced" into small-drop form by the wires of the screening. Furthermore, portions of the surfaces of the cylindrical wires are coated with a water film, and, of course, the wetted areas of structural members act as heat exchange surfaces.

In the packed tower, surface is developed by allowing the water to flow over guiding surfaces. As the water spreads over slats, structural members, etc., water-film surface is developed. In the deck-type atmospheric tower, the water is spread over horizontal slatted decks. The deck slats are spaced so that water may pass by gravity from the top of the tower to the bottom. As water strikes a deck, it spreads over the surface of a slat, flows to cover the underside of it, falls in drop or stream form to the next deck where it strikes and splashes into a spray, and then follows into the surface that covers the slat. Fig. 2 is a cross section of a typical atmospheric (free convection) cooling tower of the splash-deck type. The air is supplied by the wind, which should be broadside to the tower for greatest efficiency. Forced convection towers, on the other hand, have air supplies that are motivated mechanically. When the air is forced through the tower by fans, the tower is of the forced-draft type; when the air is exhausted from the tower by suction fans, the tower is of the induced-draft type. In this article, the sizing of atmospheric deck-type towers will be developed.

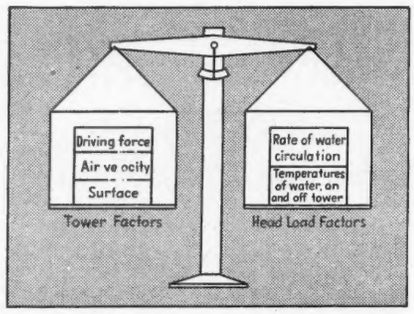


FIG. 1. Heat balance in a cooling tower is similar to weight balance on a scale.

TABLE I—Factor *V* for Various Broadside Winds of Approach

Wind, m.p.h.	Factor V
5	1.00
4	1.10
3	1.25
2	1.45
1	1.70
0	2.10

The surfaces of the moving water films are considered insulated with a thin film of stagnant, saturated air. An increase in the air velocity (Fig. 1) reduces the film thickness by a dynamic, peeling action. Thus, as in the case of any insulation problem, the reduced thickness of insulation permits greater heat flow. Increased air velocity over the cooling surfaces of a given atmospheric tower is accompanied by an increased weight of air per unit of time, with a consequent lowering of the out-going wet-bulb reflected in increased driving force.

Calculating Tower Capacity

Fig. 3 presents a set of cooling curves, computed by stepwise integration, for the condition of air flow at right angles to the water flow in a cooling tower of the atmospheric, splash-deck, type. In using the curves, one locates the C_2 value corresponding to the temperature T_2 of the heated water onto the tower, and the C_1 value corresponding to the temperature of the cooled water as it leaves the tower. Then:

$$C = C_2 - C_1 \quad (1)$$

The number of splash decks may now be computed from the equation

$$N = rCV/m \quad (2)$$

where N is the number of splash decks, r is given by Fig. 4, m by Fig. 5, and V by Table I. For barometric pressures other than 30 in. Hg, to which Fig. 3 applies, the number of decks will vary inversely as the square root of the barometric pressures. For a barometric pressure of 24 in. Hg, the number of decks computed from Equation (2) should be multiplied by $(30/24)^{0.5}$, or 1.12.

Example 1—Design a cooling tower to cool 1,800 g.p.m. from a temperature of 83 deg. F. to a temperature of 73 deg. F. The approach to the wet-bulb is to be 5 deg. F., and the broadside wind is 4 m.p.h. Assume an active width (face to face of posts) of 10 ft. and an active length (center to center of end posts) of 100 ft. Decks are to be spaced vertically at 12 in. center to center. The barometric pressure is 30 in. Hg.

Since the wet-bulb specified is not covered by one of the curves of Fig. 3, an interpolation is necessary. T_2 is removed from the wet-bulb by an approach of (83 — 68), or 15 deg. F. An equal approach for a wet-bulb of 60 deg. F. indicates a temperature of (60+15), or 75 deg. F. Likewise, the value for 70 deg. F. is computed at 85 deg. F. A line is drawn on Fig. 3 joining 85 deg. on the 70 deg. wet-bulb curve with 75 deg. on the 60 deg. wet-bulb curve. C_2 is located on this line of equal approaches at a value of 22.8 decks where the temperature line of 83 deg. makes intersection. C_1 is located in a similar manner at a value

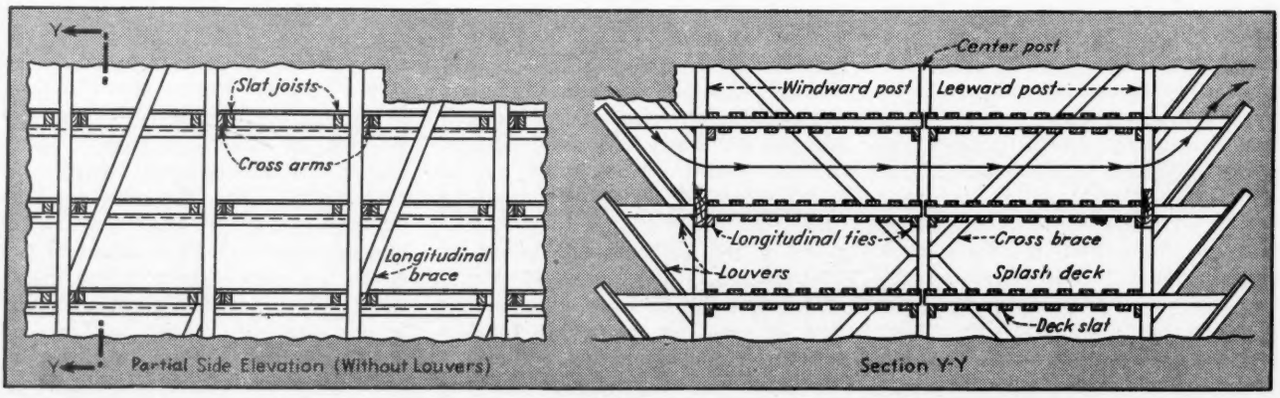


FIG. 2. Cross section of an atmospheric cooling tower of the splash-deck type. Note location of decks and direction of wind travel

of 11.8 decks. C is then equal to (22.8 — 11.8), or 11.0 decks.

From Table I, $V = 1.10$. On Fig. 4, a line drawn from the H scale at 12 in. to the W scale at 10 ft. intersects the reference line at a point which is then joined with the F scale by a line passing through a value F of 1,800/(10 X 100), or 1.8 g.p.m. per sq. ft. The intersection on the r scale is 4.27.

On Fig. 5, an F of 1.8 is joined with an H of 12 to give m equal to 2.20. Then, from Equation (2), $N = 4.27 \times 11.0 \times 1.10/2.20 = 23.5$ decks required for the tower; use 24 decks. One should note that the dimension of the C scale is decks, but the number of decks for a given tower must be computed by means of Equation (2). In the event that the loading F is less than 1.5 g.p.m. per sq. ft., the intersection line from the reference line of Fig. 4 is drawn to the lowest point of the F scale, regardless of the value of F.

Cannery Cooling

In the solution of any practical problem involving a cooling tower, it is most important that all of the links in the heat exchange be strong through investigation and adequate consideration. An example in cannery heat discard from sterilized cans will illustrate this necessity.

Example 2—Cans from a continuous agitating pressure sterilizer are cooled in a continuous cooler[5a] in which the cans travel in a spiral path similar to that developed in the cooker. The cooling water is admitted at the bottom of the cooler, and overflows into the discharge pipe on the opposite side at the opposite end. The cooler then resembles a cross-flow heat exchanger; the tank, or shell, of the cooler compares to the shell side, while the surfaces of the cans compare to the tubes that contain the material to be cooled. The cooker has a capacity of 2,380 No. 2½ round cans, each can having an approximate net weight capacity of 1.81 lb. and a container weight of 0.29 lb.[6] The temperature of sterilization is 238 deg. F., and the average temperature after cooling is 110 deg. F. The cooking time is 23 minutes for solid pack tomatoes. Assume the temperature of water leaving the cooler to be 15 deg. F. below the average can temperature. Determine: (a) the cooling water required in g.p.m., if the initial temperature of the water entering the cooler is 70 deg. F.; (b) the water that must be supplied to the same size cooler if it enters from a cooling tower at a temperature of 76 deg. F. while the operational wet-bulb is 70 deg. F. and (c) whether the final can temperature would exceed safe limits if the water flow is that of (a) with the water entering the cooler at 76 deg. F.

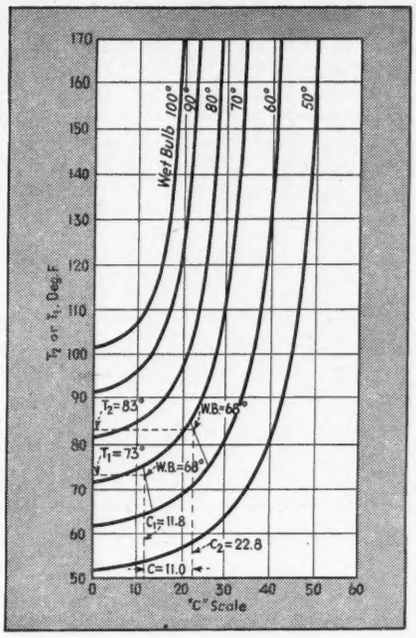


FIG. 3. Cooling chart for air flow at right angles to water flow and 30-in barometer

Assume a specific heat[5b] of 1.0 B.t.u. per lb. per deg. F. for the contents of the can and 0.12 B.t.u. for the can.[3d] The temperature reduction is 238 — 110 = 128 deg. F. The number of cans per minute is 2,380/23 = 103. The B.t.u. per can to be surrendered to the cooling water are:

Contents of can, 1.81×1.0	= 1.81
Metal can, 0.29×0.12	= 0.035
B.t.u. per deg. F.	= 1.85

(a). The heat to be surrendered to the cooling water is $103 \times 1.85 \times 128 = 24{,}400$ B.t.u. per minute. The temperature of the water leaving the cooler will be 110 — 15 = 95 deg. F. Let Q represent the g.p.m. of water passing through the cooler. Then:

$8.33 \times Q \times (95\text{–}70) = 24{,}400$

$Q = 117$ g.p.m.

(b). The coefficient of heat exchange between cans and water is assumed to be constant. Then, under the conditions of (b), the flow of water must be increased to compensate for the increased temperature of water entering the cooler. The rates of heat exchange, with a constant coefficient, are compared on a basis of the products of the area times the logarithmic mean temperature difference (*MTD*). Since the number of cans cooled per minute is constant, the heat exchange surface is constant. Therefore, with increased temperature of water to the cooler, decreased water temperature leaving the cooler must be obtained to realize a constant *MTD* applicable to either condition of the problem.

The logarithmic mean temperature difference, based on cross flow, is

$$MTD = f\left[\frac{(t_s - T_2) - (t_c - T_1)}{2.3 \times \log_{10}(t_s - T_2/t_c - T_1)}\right] \quad (3)$$

Where,

t_s = Temperature of sterilization, deg. F.

t_c = Temperature to which cans are cooled, deg. F.

T_1 = Temperature of water entering cooler.

T_2 = Temperature of water leaving cooler.

MTD = Logarithmic mean difference for cooler, deg. F.

f = Correction factor for cross flow as computed by Nusselt[7] and listed in Table II.

From the terms of problem (a), $t_s = 238$ deg.; $t_c = 110$ deg.; $T_2 = 95$ deg.; and $T_1 = 70$ deg. Then,

$$\frac{t_s - t_c}{t_s - T_1} = \frac{238\text{–}110}{238\text{–}70} = \frac{128}{168} = 0.76$$

$$\frac{T_2 - T_1}{t_s - T_1} = \frac{95\text{–}70}{238\text{–}70} = \frac{25}{168} = 0.15$$

Interpolation in Table II yields $f = 0.944$. Therefore, from Equation (3)

$$MTD = 0.944\left[\frac{(238\text{–}95) - (110\text{–}70)}{2.3 \log_{10}\left(\frac{238\text{–}95}{110\text{–}70}\right)}\right] =$$

$$\frac{(143\text{–}40) \times 0.944}{2.3 \log_{10}(143/40)} = \frac{0.944 \times 103}{2.3 \times 0.553} =$$

76.5 deg. F.

From Table III, 88 deg. F. would probably be chosen for T_2 (the temperature of water leaving the cooler). The new water rate would then be 24,400/8.33 (88 — 76) = 244 g.p.m. This rate of flow is very high and unsatisfactory. Actually, a slight increase in cooler length would compensate the

TABLE II—Correction Factor for Cross Flow—f

$\frac{T_2 - T_1}{t_s - T_1}$	$(t_s - t_c)/(t_s - T_1)$						
	0	0.200	0.400	0.600	0.760	0.800	0.900
0.0	1	1.000	1.000	1.000	.....	1.000	1.000
0.15	..	.....	.....	0.966	0.944	0.939	.....
0.2	1	0.988	0.975	0.955	.....	0.919	0.873
0.4	1	0.975	0.948	0.909	.....	0.824	0.738
0.6	1	0.955	0.909	0.835	.....	0.698	0.581
0.8	1	0.919	0.824	0.698	.....	0.500	0.360
0.9	1	0.867	0.738	0.581	.....	0.360	0.220

TABLE III

T_2	Counter-flow *MTD*	$\frac{T_s - t_c}{t_s - T_1}$	$\frac{T_2 - T_1}{t_s - T_1}$	f	True *MTD*
95	75.8	0.79	0.12	0.953	72.2
94	76.1	0.79	0.11	0.957	72.8
92	76.9	0.79	0.099	0.961	73.8
90	77.6	0.79	0.086	0.966	75.0
88	78.2	0.79	0.074	0.971	76.0
87	78.6	0.79	0.068	0.973	76.6

TABLE IV—Loading Intensity F

F	r	m	N
1.0	3.96	3.08	20.8
1.2	3.96	2.82	22.8
1.4	3.96	2.59	24.7
1.6	4.06	2.38	27.6

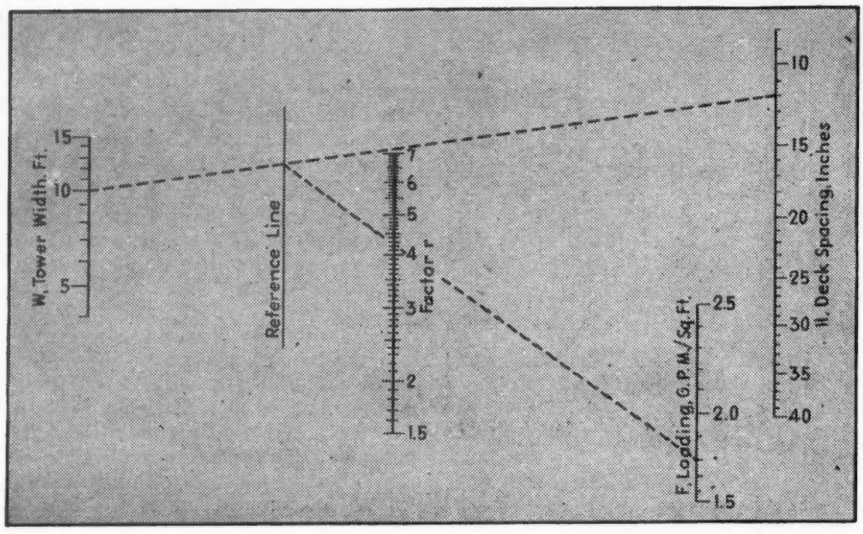


FIG. 4. Alignment chart for evaluating r in Equation (2).

MTD for the increased temperature of entrance water at 76 deg. F., thus leaving T_2 at 95 deg. F. The rate of water flow would then be 24,400/8.33 X (95 — 76) or 154 g.p.m.

(c) Cans should not be cooled[8c] to temperatures that would allow them to remain wet and rust. A temperature of 110 to 115 deg. F. is high enough to dry the cans, yet not sufficiently high to injure the contents. If t_c is set at 115 deg. F., T_2 becomes 100 deg. F. and T_1 is 76 deg. F. The *MTD* is then 74.2 deg. F., while the temperature range in the cooling water is (100 — 76) = 24 deg. F. If the length of the cooler were then increased in the ratio of

$$\frac{76.5}{74.2} = 1.03,$$

and if the water flow were increased to 24,400/8.33 X (100—76) = 122 g.p.m., a theoretical balance would occur. Within the range of accuracy of the data, however, the original cooler would be satisfactory with a probable top temperature of cans of 115 deg. F. During periods of low wet-bulb, the temperatures of the cans would be below 115 deg. F.; while the temperatures would be higher at the design wet-bulb of 70 deg. F.

The solutions of Example 2 check closely with results obtained in practice. The important implications are that coolers should be sized for actual operating water temperatures; that water flow must be proportioned to heat removal; and that the cooling tower design conditions[8] for wind and wet-bulb must be selected with care, in order that the tower may be of ample size to control the can temperatures during days of peak conditions. Proper wet-bulb for operation in the United States during summer months may be selected from Albright's[9] excellent analysis. For other seasons, the design wet-bulb may be adjusted by a practical temperature increment based upon the seasonal variations. Thus, operations in autumn usually will proceed at a wet-bulb below that selected for summer conditions. The available records of the Weather Bureau should be examined with care.

Effect of Wind Velocities

Table I indicates the variation of equivalent tower size that occurs as the wind velocity changes. A tower should not be designed for a wind velocity in excess of 5 m.p.h. When it has been designed for such operation its equivalent size ratio for the design load at still air condition is 1.00/2.10, or 48 percent. If the design cooling range were from 100 to 76 deg. F. at 70 deg. wet-bulb and 5 m.p.h. wind, the range would move upward in the thermometric scale for zero wind at the same wet-bulb and water range. The value of the C intercept for 5 m.p.h. would be (27.8—13.0), or 14.8 (Fig. 3). For zero wind, the equivalent C intercept would be

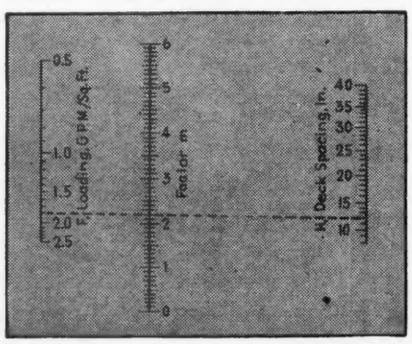


FIG. 5. Alignment chart for evaluating m in Equation (2).

(0.48 X 14.8), or 7.10. A range of 24 deg. F. fitted against a C value of 7.10 on the wet-bulb curve of 70 deg. F. indicates a range position from 110 to 86 deg. F. The terminal difference for a can temperature of 115 deg. F. would be 5 deg. instead of the 15 deg. of the terms of the problem. By the methods of Example 2, the *MTD* would be 62.2 deg. F.; and the original cooler length (for water at 70 deg. F.) should be increased to satisfy the ratio of 76.5/62.2, or 1.23. Thus, the water flow would be 122 g.p.m. in a cooler of a length 23 percent greater than the cooler of part (a) Example 2.

Obviously, there are a number of combinations of tower and cooler sizes that may give an adequate heat disposal system for a given load. Several combinations may be selected; the total costs may be computed and plotted; and the combination representing the minimum cost for cooler, piping, pumps, sumps, tower, foundations, etc., may be selected. Management would decide whether the minimum should be based upon first cost or operating cost.

In the case of retorts for pressure cooking, cooling is not continuous. Furthermore, the retorts, crates and cars must be cooled with the cans. With equipment of a ferrous nature, the weight should be multiplied by 0.12 $(t_r - t_c)$ to arrive at the cooling load, which must be handled in addition to the cans. For a very fine treatise on the heating cycle of retorts, the reader is directed to the article of Lewin and Lewin.[10] Retort cooling should be staggered and cycled, with proper sumps, to give a cooling tower flow that approaches, as nearly as possible, continuous cooling. The tower should then be designed for the peak rate of the cycle.

Where wind velocities approximate 2 m.p.h., the forced convection tower is indicated. The remaining weather variable is then the wet-bulb temperature; and very satisfactory cooling tower operation is thus obtained.

Vacuum Pan Condensing

On occasions, one must determine the capacity of a cooling tower for service other than that considered in the original design. This is best accomplished by computing the number of decks for several loading intensities at the design conditions

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What Are the Potentialities Of New Films and Foils?

New packaging materials, providing better protection and increased eye-appeal for food products, are being developed rapidly and successfully. But, inability to secure needed packaging machinery may temporarily retard adoption

By FRED I. HANMER, Jr., Keysville, Va.

EMPHASIS in the design of packaging materials has changed from the meeting of the many exposure and handling hazards of the war to the problem of complying with the demands of a sales-conscious, competitive, postwar era. With this change we can anticipate a galaxy of new food packages in our local, retail markets. Some food packages will go back to the fancy style of the days prior to the WPB limitations orders. Most of the new packages, however, will be designed to incorporate more functional and protective properties along with beauty and sales-appeal. In general, the design of packaging is not reverting to the 1940 status, which indicates a permanent advancement in the science of packaging.

Development in almost every phase of industry was accelerated during the war era. Packaging was no exception. In the case of food packaged for army supply during the war, the greatest exposure hazard was water, both vapor and liquid, since rough handling and humid storage conditions were common with overseas shipments. Most foods in the category of cereals and dehydrated foods tended to absorb moisture from a humid atmosphere and became lumpy, caked, sticky or moldy. Accordingly, the advances made during the war in the protection of foodstuffs were chiefly in the nature of applying packages that had suitable protective properties. Little or no emphasis was placed on eye-appeal. Today the packaging specialist is attempting to employ these same protective features and at the same time satisfy the demands of the sales department with packaged foods possessing beauty and eye-appeal to stimulate impulse-buying. The package must sell *and* protect the product.

Applications of wartime developments to postwar food packages will not be realized overnight, but will take place in the course of the next few years. This is especially true of certain of the plastic films that require special equipment for manufacture, fabrication and application. Automatic packaging machines are not readily available. In the first half of 1946, the backlog for orders increased faster than deliveries, despite the fact that production had multiplied many times. Deliveries may become worse before they get better.

The synthetic resin industry has grown to extensive proportions since the early twenties. Production of synthetic resins has doubled about every three years. Increase in the use of plastic materials in the food packaging industry has been equally phenomenal. New types of cast and calendered plastic film have been offered, the former usually the more transparent.

Polyethylene film, an example of a flexible, plastic packaging material, provides waterproofness, greaseproofness, durability and toughness at normal and low temperatures, and freedom from odor or flavor impartation. It possesses a good degree of transparency, has

Many varieties of cheese are attractively packaged in foils. Despite the complete absence of transparency, metal foils possess eye-appeal and prevent any weight losses during storage.

good resistance to water-vapor permeation or water absorption, and exhibits many other desirable features. Polyethylene is one of the newest plastics. It was developed in England and introduced into the United States in 1943.

Conclusive research has not been conducted in the evaluation of polyethylene film for food packaging, although some favorable results have been obtained. Under present conditions, polyethylene film is difficult to apply to the food product because it cannot be satisfactorily handled on existing wrapping machines. Widespread use of this film will be retarded until suitable low cost and easily operated machinery is designed and produced. Research is being directed to the all-important job of handling the film on automatic wrapping machinery. Specifications are simple, calling for a supporting web and a method of effecting seals. The intricacies of completing designs and producing low-cost machines are not simple.

Sealing Problem

The problem of sealing the synthetic resin films is about as challenging as any phase of the packaging game. Ordinary heat-sealing methods are not satisfactory because the surface adjacent to the heating element softens before the heat travels through the film to effect the weld. A very successful electronic method has been devised for fabrication in instances where it is possible to place induction coils on both sides of the film at the bonding area. In more common instances where the film is employed as a protective wrapper for the product, a seal is produced by applying treatment to the sealing area on one side of the film. One of the proposed methods of accomplishing this is through the use of infra-red rays. A light absorbent ink must be printed on the sealing area of the film. After the conventional folding operation, infra-red rays are directed on this area to accomplish a seal. This sort of study is underway, and it may be assumed that eventually the necessary wrapping machinery will be available.

The application of polyethylene film, particularly in casing or tubular form, to ground hamburger meat, sausage meat, luncheon meat loaves and cooked ready-to-eat hams is worth investigating by meat-packers. Its chief asset lies in its greaseproofness and resistance to water and water-vapor permeation.

Polyethylene film is ideally suited for packaging frozen meats, fruits and vegetables because: (1) It is free from odors or flavors that might contaminate the food; (2) it retains sufficient durability at quick-freezing temperatures and low temperature storage so that it can be handled without breakage; (3) it can be extruded and fabricated into seamless bags; (4) it can be made practically transparent and (5) it has sufficient water-vapor resistance to prevent freezer burn during low temperature storage.

Polyvinyl Films

Plastic films made of pure or mixed polymers or copolymers of vinyl chloride, vinyl acetate or vinylidene chloride have been investigated to some extent in connection with food packaging. Except for a few instances they have not proved satisfactory. They are greaseproof, flexible at room temperatures, heat-sealable, partially transparent, waterproof and, with the exception of the polyvinylidene chloride, somewhat permeable to water vapor. Thus, they might be suited for packaging fats, oils or such products, requiring their specific properties. Polyvinylidene chloride film possesses the greatest resistance to water-vapor transmission of any of the plastic films. This material might have found many applications in the packaging of foods had it not been for an objectionable plasticizer odor, inherent in its manufacture. Although it was not adopted for the packaging of food for the army, it was used extensively by the Air Corps as a water and water-vapor barrier material. Much research has been conducted on sealing methods for polyvinylidene chloride film. All of the plastic films present problems in sealing even though they are fusible with heat. Generally speaking, the plastic becomes oriented with heat, loses its form, requires a support to maintain its shape and necessitates a covering material to prevent adherence to the heating element. Recently, a new heat-sealer for plastic films was announced that eliminates shrinkage or sticking of the plastic.

Use of cellophane as a wrapper for fresh sliced bacon offers protection, permits visibility and prevents any contamination.

Plain cellophane wrapper for sliced bread permits breathing to eliminate sweating and sogginess. Mold growth is minimized.

As yet, no important uses, as food wrappers, have been made of other plastic films such as polystyrene, acrylates, phenolic resins, urea resins, chlorinated polyvinyl chloride and allyl resins. All of these materials, however, are of interest and offer special features that may find their places in solving tomorrow's packaging problems. Research has been accelerated to render these films more water-vapor resistant. Some successful developments have resulted in laminations and the incorporation of waxes in the dope prior to either casting or calendering. No one foresees the far-reaching possibilities of synthetic resins nor anticipates what "super" film may be developed through polymerization or copolymerization.

Foils and Laminations

An important flexible packaging material that may be expected to receive greater acclaim and more widespread usage is the thin foil of pure aluminum. Of all the flexible wrapping materials known to date, metal foil offers the greatest resistance to water-vapor permeation. Its permeability depends upon its pin-hole count. The pin-hole count of aluminum foil is considered to be negligible when the thickness is 0.0008 inches or more.

During the past few years aluminum foil has largely replaced lead foil, tin foil and composition foil as a food wrapper. Converters have made progress in laminating aluminum foil to all types of film. Laminated combinations of foil and

certain waxed papers, or even cellulose acetate will not involve a great deal of expensive conversion. Problems in connection with the use of aluminum foil were centered chiefly around the job of laminating or coating the foil to make it suitable for handling with automatic equipment. Aluminum foil, without the support of a coating or backing sheet, is difficult to seal and susceptible to puncture or rupture.

Some packages consist of aluminum foil laminated to box-board and converted into a folding carton. Although this may afford an attractive package, it does not result in an efficient use of the foil as a barrier to water-vapor. Frozen food containers made of heavier gages of aluminum foil have been announced recently. Aluminum foil, despite complete absence of transparency, possesses an inherent asset of eye-appeal.

Foils have been successfully coated with heat-sealable plastics, such as butvar and polyvinyl chloride-acetate in combination with vistanex. Many other types of plastics are suitable for coating foil to provide color, means of heat-sealing and protection from corrosion by organic food acids.

To date, surprising results have followed the use of foils and laminated foils in the packaging of fresh and frozen meats, luncheon meats, sliced and dried beef, cheese, bread, powdered bouillon, dehydrated foods, and as inner pouches for precooked frozen foods. The possibilities of aluminum foil in the field of packaging are endless.

Cellulose Derivatives

Cellulose derivatives include plain cellophane, moistureproof cellophane and the cellulose plastics; cellulose acetate, cellulose acetobutyrate and ethyl cellulose. Methyl cellulose film is not a suitable food wrapper. Cellulose derivatives comprise the bulk of transparent films.

Cellophane will be in demand for years to come. It represents one of the steps of progress in the development of the average package. For years it was considered an expensive luxury, which could be used only for the more special items. Now it is included in the category of protective wrappers. The ability of cellophane to enhance sales-appeal is well recognized throughout the food industry.

Plain cellophane is a sheet of pure regenerated cellulose to which has been added a softening agent and a surface size. Although it is nonporous to air or oils, it is a hydrophyllic sheeting offering no resistance to water-vapor transmission. It is used for packaging those food products that neither require water-vapor protection nor a water-vapor barrier. For example, bacon does not require a water-vapor barrier. Fresh baked pies do not require a barrier as water-vapor must pass through the wrap to eliminate sweating and sogginess. Plain cellophane is also used as a decorative sanitary wrapper for certain candies and related foods.

Several new candy packages created by E. I. du Pont de Nemours & Co.'s Cellophane division have been designed to take advantage of the rapid upswing in impulse buying.

Moistureproof cellophane for use on moist food products, is a sheet of pure regenerated cellulose that has been coated on both sides with an extremely thin continuous layer of lacquer. Cellophane with lacquer coating on one side only is produced for special applications, principally laminations. A lacquer coating is applied by means of an anchoring agent. Degree of moistureproofness of cellophane depends to some extent upon the properties of the lacquer. By varying the composition of the lacquer, manufacturers have developed films with low and high moistureproofness and with or without heat-sealing properties. Manufacturers of this type of film have also made other modifications as a result of changes in the amount and type of plasticization. As a result, the needs of various products and packaging machines are met. Furthermore, considerably lower moisture-vapor transmission rates and greater strength and durability have been obtained by laminating cellophane to metal foil, to itself, or to certain papers.

Some plastic and laminated foil films have now taken the place of cellophane as luxury materials. Cellophane is being reclassified as a functional wrapper. Many food processors have found it economical to replace waxed papers with cellophane in view of improved protection of the product, plus acceleration of sales. Due to advancements in packaging, many food manufacturers are finding it necessary to use cellophane just "to keep up with the times." Research is ever active in cellophane to improve the film and make it more suitable to each individual food application. Saran-coated cellophane was one of the many cellophane developments of the war. It may be used as a commercial postwar wrapper.

Cellulose plastic films are not used in food packaging to as great an extent as cellophane. They are only partially water-vapor resistant, are lower in durability and not easily heat-sealed. Their greatest asset is their dimensional stability or resistance to shrinkage, expansion or puckering under changing humidities and storage conditions. This property renders the cellulose plastic films better suited for lamination to metal foil or paperboard

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Trucks Haul Tomatoes The Year Round

Here is an Atlanta packer who gathers the crops wherever they are growing, repacks them, then hauls them by reefer truck to areas where the fresh product is out of season

ROAD tractors and refrigerated trailers have made possible the establishment of the unusual business of supplying fresh tomatoes all year round. No longer do lovers of this delicious fruit have to wait for "home growns," for the Tom-A-Toe Produce Co. of Atlanta, Ga., collects tomatoes from those areas in which they are in season and distributes them in areas in which they are in demand but not available from local growers.

Always Procurable

Tomatoes are in season somewhere in this country all the year round. Hence to supply an all-year round demand, it is necessary to transport the fresh tomatoes from the areas where they are being produced to those where they are not. For example, the tomato season in Florida is from November through April. From February to November they are harvested in Mississippi, Texas, Ohio, North and South Carolina, Alabama, Georgia, Indiana, New Jersey, Virginia and New York.

During the months of July, August and September, most of the company's tomatoes come from Georgia and Alabama. Some are brought to the Tom-A-Toe plant by the farmers who transport them in their own vehicles.

The Tom-A-Toe company hauls the fresh tomatoes from the producing areas to its packing plant in Atlanta. There they are graded, repacked and loaded for final distribution. The company does not process the tomatoes in any way except to repack them.

The same tractors and refrigerated trailers used to transport the fresh tomatoes from the various growing areas are also used to distribute them to independent produce companies in areas where they are out of season. Deliveries have been made to Charlotte, N. C., Richmond, Va., Washington, New York City and even as far north as Boston. During the war, deliveries were made regularly each month to practically all large army and navy forts, posts and training camps in the Southeast. This government business, however, has dropped off 85 percent in the year that has elapsed since the end of the war.

The greater part of the company's sales volume is picked up at its Atlanta plant by customers, who haul their own merchandise. They come from as far west as Chicago and from points in Indiana.

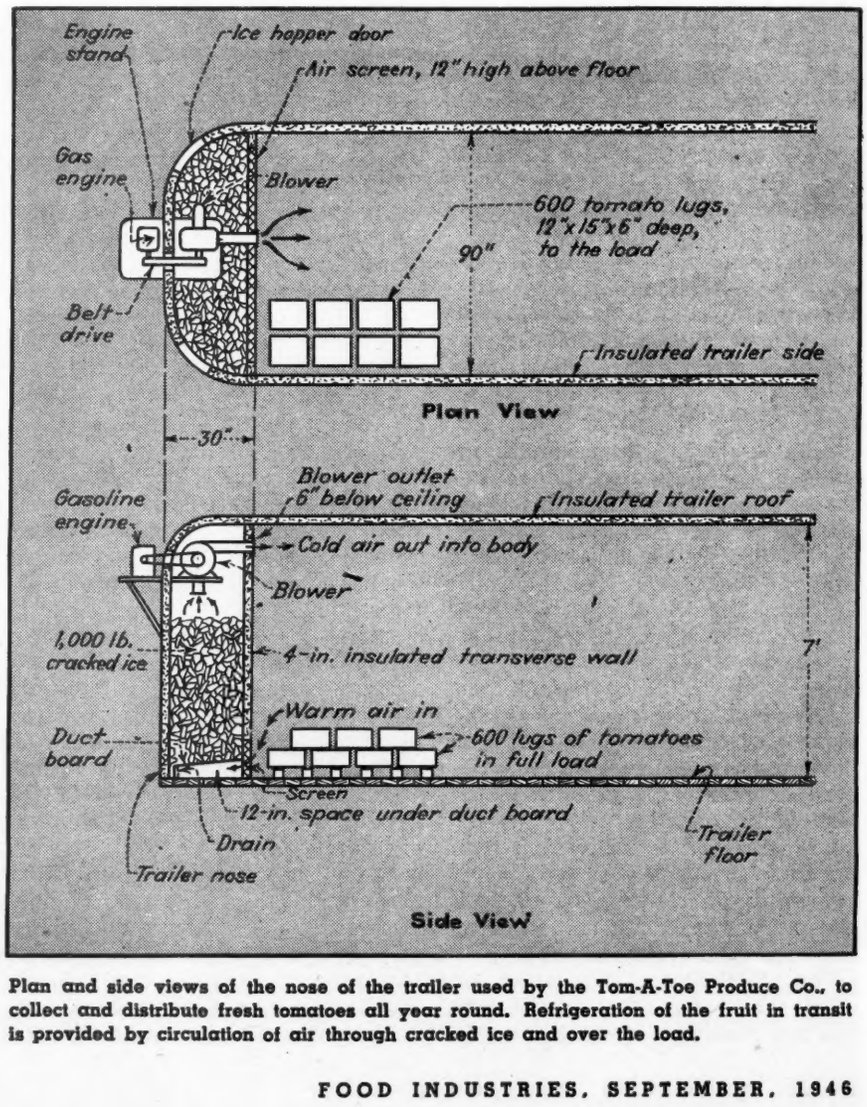
The Tom-A-Toe company's automotive equipment consists of a fleet of four tractors and four refrigerated semi-trailers, two Trailmobiles made by the Trailmobile Co., Cincinnati, and two Edwards, made by the Edwards Iron Works, Inc., South Bend, Ind. The payloads carried average 22,000 lb. each.

Distribution Methods

When delivered to customers, the tomatoes are carried in the trailers in "lugs," wooden crates, 15 x 12 x 6 in. From 600 to 650 lugs make up a trailer load.

The Tom-A-Toe company supplies the lugs in which the tomatoes are sold and also supplies its own boxes or crates when going to the fields to purchase the tomatoes. Quite often the lugs are saved and returned to the Tom-A-Toe Company.

Sometimes bulk loads are delivered in the field boxes and these boxes are always returned to the company. When there are no empty



Plan and side views of the nose of the trailer used by the Tom-A-Toe Produce Co., to collect and distribute fresh tomatoes all year round. Refrigeration of the fruit in transit is provided by circulation of air through cracked ice and over the load.

This of one of the fleet of four refrigerated trailer tractors operated by the company. The tractor, with its sleeper cab, is a White, and the Edwards Iron Works built the special insulated and refrigerated trailer, which has a load capacity of 22,000 lb. The small gasoline engine, which drives the interior air circulating blower is shown mounted on the nose of the trailer.

boxes to be sent back, the trailers return empty.

The tomatoes are the property of the company from the time they are picked up at the fields until they are delivered to the company's customers. As a result, the tractors are operated as a private and not as a common carrier.

Truck Operation

Operated as private vehicles, the tractors and trailers may run to any growing field and deliver to any destination without obtaining route-rights from the Motor Carrier Bureau of the Interstate Commerce Commission. However, the company vehicles must comply with the safety regulations established by the commission.

Those regulations require that no driver may drive more than 10 hours in any 24-hour period and not more than 60 hours in any consecutive period of 168 hours. Since many of the long pickup runs to the growing fields cannot be covered within 10 hours, and overnight stops are not practical on account of the perishableness of the load, two drivers are necessary. This in turn requires the use of a sleeper cab on each tractor such as shown in the accompanying illustration.

The Edwards semi-trailers, one of which is also shown in the same illustration, is of the insulated, refrigerated type. It is 28 ft. long, 90 in. wide and 7 ft. high, all inside dimensions. It is insulated all around with a 2 in. layer of Fiberglass.

Refrigeration of the trailer body is provided through a circulated cold-air system employing a wet ice hopper and a blower fan. As shown in the accompanying drawings, the ice hopper is located in the nose of the trailer. It holds 1,000 lb. of ice, not in cakes, but broken up into fairly large pieces.

The ice is loaded into the hopper through two 24 x 30 in. doors in the trailer nose near the top. These doors are reached by metal ladder rungs extending upward from the level of the trailer floor.

The ice hopper is formed by the inside of the trailer nose and an insulated transverse wall 4 in. thick, extending from the trailer floor to the roof. The false floor of the ice hopper is 12 in. above the trailer floor at the rear and inclined toward the front to form a duct board for draining off the water from the melted ice.

How Air Is Blown

The transverse wall between the false floor of the hopper and the trailer floor is open and covered with a screening for the full width of the trailer body. It is through this screened opening that the air is drawn by the blower for circulation throughout the trailer body.

The blower is supported on a platform inside the hopper with the blower outlet 6 in. below the trailer ceiling. The blower is belt driven from a 2¾ hp.-Briggs & Stratton gasoline engine mounted on its own platform outside the trailer nose as shown in the accompanying illustration.

The circulation of air that keeps the tomatoes cold in transit is through the screened opening in the transverse wall below the false bottom of the hopper and up through the open spaces between the pieces of ice in the hopper. It then passes out through the blower exhaust into the space between the top of the load and the ceiling of the trailer.

Raised From Floor

The velocity of the cold air as it is expelled from the blower exhaust carries it to the rear of the trailer body. In transit, it picks up the heat in the load before it is returned along the floor of the body to the screened opening at the front by the suction of the blower.

Circulation of the cold air throughout the length of the body is aided by carrying the lugs on floor racks whose tops are about 2 in. above the floor. The circulation of air maintains an inside body temperature of between 40 and 50 deg. F., which is sufficient to maintain the tomatoes in prime condition while in transit.

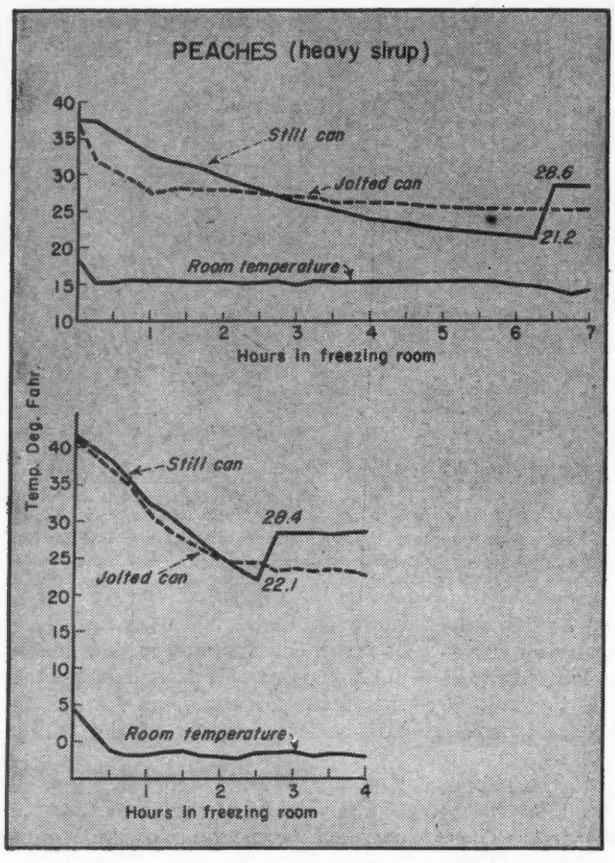
Roadside Re-icing

As the ice in the hopper melts, the water is led off through a drain in the trailer floor onto the ground. The hopper is refilled in transit at roadside re-icing stations. Also, as an aid to maintain the required inside body temperature, the trailer roof is painted with aluminum to better reflect the sun's rays.

After the above desription of the Tom-A-Toe operation had been prepared, James J. Cerniglia, president of the Tom-A-Toe Company, advised that the tractor-trailers described have been sold recently to one of the drivers and are now operated on a contract basis.—The Editors.

Freezing Point Data Sheets And Cooling Curves

PART IV

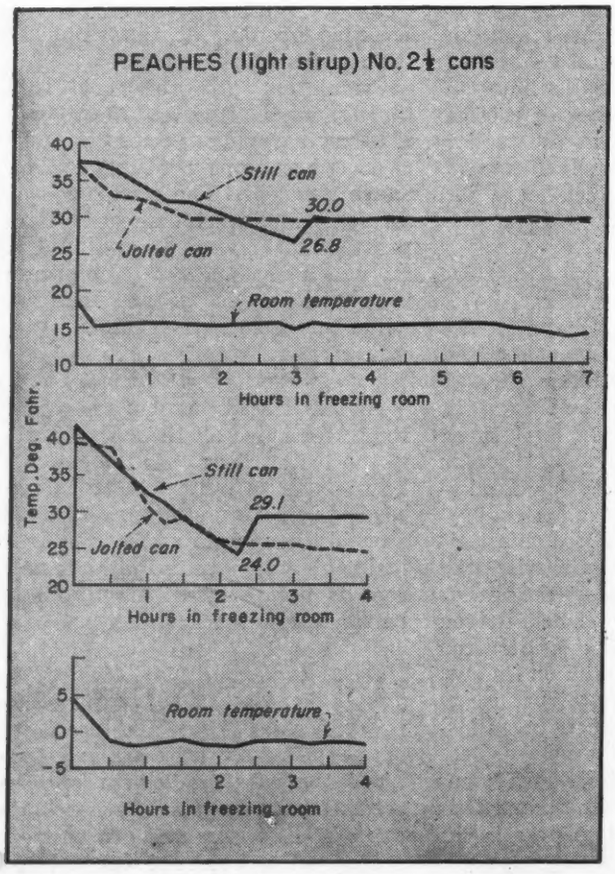


Peaches, Heavy Sirup

Test Number	Freezing room temp. range	Commodity starting temp.	Time to reach freezing point (hr.)	Undercooling (hr.)	Undercooling (deg.)	Total time to freeze (hr.)	Freezing point
No. 2½ size cans:							
1-Still	— 1.2- — 2.1	41.8	1½	1	6.3	2½	28.4
2-Still	— 1.2- — 2.1	42.6	1¾	1	2.7	2½	28.5
3-Still	5.3- 7.4	36.8	1½	2	8.2	3½	28.4
4-Still	5.3- 8.3	38.4	1½	3	9.4	4¼	28.2
5-Still	14.9- 15.6	37.7	2¼	2	5.4	4¼	29.1
6-Still	14.9- 15.6	37.7	2¼	4¼	7.4	6½	28.6

Freezing point range, 28.2° to 29.1°F.; average, 28.5°F.

Inspection made immediately after each test showed a heavy slush. Jolted samples did not undercool, hence their freezing points could not be determined.



Peaches, Light Sirup

Test Number	Freezing room temp. range	Commodity starting temp.	Time to reach freezing point (hr.)	Undercooling (hr.)	Undercooling (deg.)	Total time to freeze (hr.)	Freezing point
No. 2½ size cans:							
1-Still	— 1.2- — 2.1	41.8	1½	¾	5.1	2¼	29.1
2-Still	— 1.2- — 2.1	42.0	1½	1¾	5.2	2¼	28.6
3-Still	5.3- 8.3	38.2	1	¾	2.0	1¾	29.4
4-Still	5.3- 8.3	37.6	1	¼	0.3	1¼	29.6
5-Still	5.3- 8.3	36.8	1	3	8.9	4	28.7
6-Still	14.9- 15.2	37.7	2	1	3.2	3	30.0
7-Still	14.9- 15.6	38.1	2	4	9.1	6	29.7
8-Still	14.9- 15.6	38.2	2	3¾	8.2	5¾	29.7

Freezing point range, 28.6° to 30.0°F.; average, 29.5°F.

Inspection made immediately after each test showed a heavy slush. Jolted samples did not undercool, hence their freezing points could not be determined.

Alaska Peas

Test Number	Freezing room temp. range	Commodity starting temp.	Time to reach freezing point (hr.)	Undercooling (hr.)	Undercooling (deg.)	Total time to freeze (hr.)	Freezing point
No. 2 size cans:							
1-Still	16.3- 17.3	36.5	1½	5	9.5	6½	31.0
1-Jolted	16.3- 17.3	35.0	¾	¾	4.6	1½	31.0
2-Still	14.5- 16.3	37.5	1¼	2	5.5	3¼	31.0

Freezing point, 31.0°F.

Inspection immediately after each test showed the contents hard-frozen to a depth of approximately ¾ in. around the sides of the can, with heavy slush in the middle. Hard-frozen sample variable in color, darker and slightly softer, than the unfrozen sample.

Acknowledgment

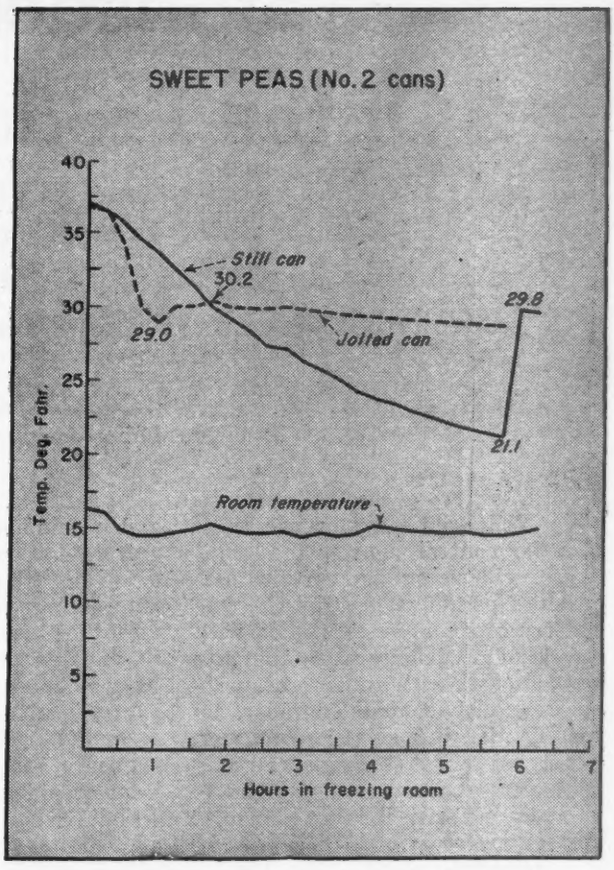
This investigation on the freezing of canned goods was conducted by D. H. Rose, USDA, and H. D. Johnson, WFA, assisted by M. N. Weatherhead, Fruit Growers Express Co. Detailed acknowledgments are given in previous data sheets.

Sweet Peas

Test Number	Freezing room temp. range		Commodity starting temp.	Time to reach freezing point (hr.)	Under cooling (hr.)	Under cooling (deg.)	Total time to freeze (hr.)	Freezing point
No. 2 size cans:								
1-Still	16.0-	17.5	33.3	1	1¾	5.7	2¾	28.8
1-Jolted ..	16.0-	17.5	32.5	½	1	0.7	1½	29.0
3-Still	14.5-	16.1	37.1	2	4	8.7	6	29.8
3-Jolted ..	14.5-	16.1	36.8	¾	½	1.0	1¼	30.2

Freezing point range, 28.8 to 30.2-F.; average, 29.5°F.

Inspection immediately after each test showed the contents had frozen to a depth of approximately ½-in. around the sides of the can, with a heavy slush in the center. Hard-frozen sample slightly softer than the unfrozen sample.

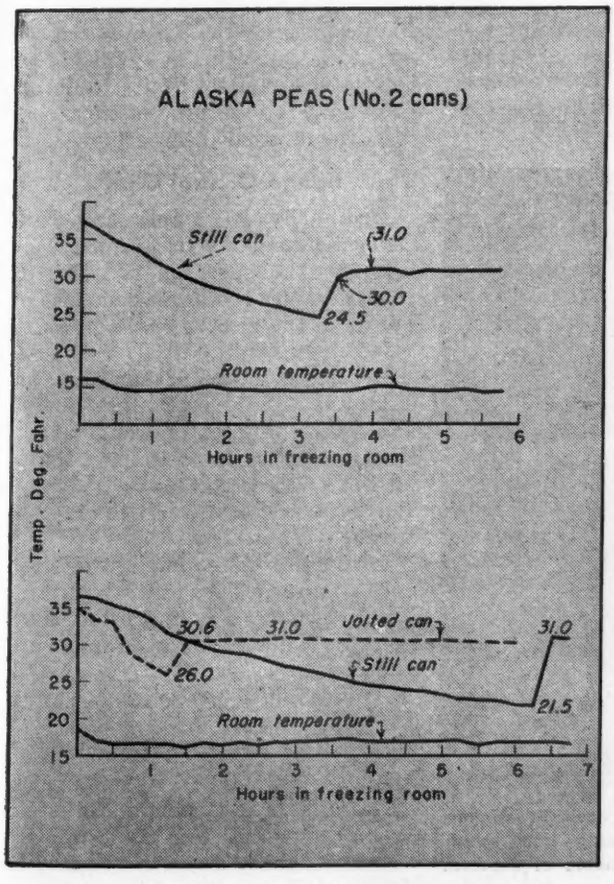


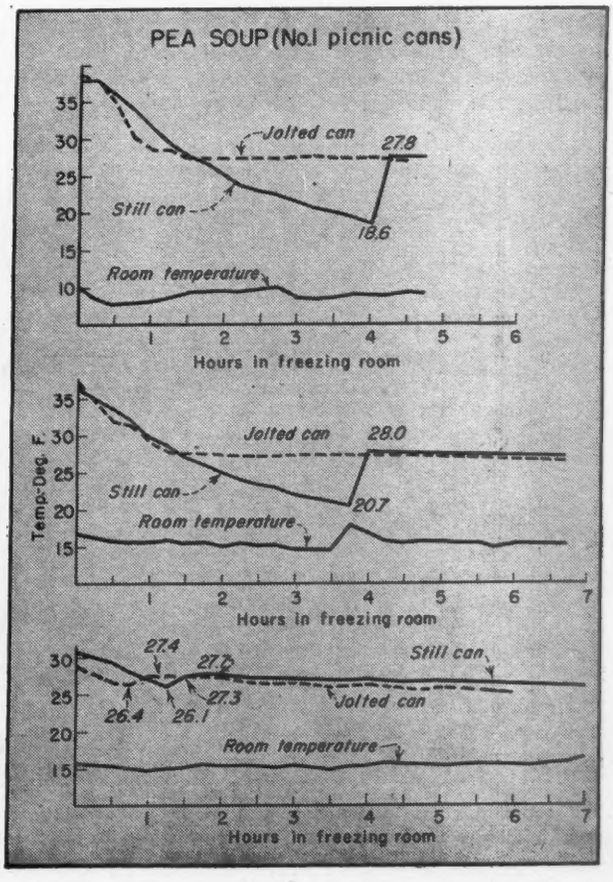
Pea Soup

Test Number	Freezing room temp. range		Commodity starting temp.	Time to reach freezing point (hr.)	Under cooling (hr.)	Under cooling (deg.)	Total time to freeze (hr.)	Freezing point
No. 1 picnic cans:								
1-Still	14.9-	15.8	30.7	¾	1	1.2	1¾	27.7
1-Jolted ..	14.9-	15.8	28.9	¼	¾	1.0	1	27.4
2-Still	14.7-	16.9	36.3	1½	2½	7.3	4	28.0
2-Jolted ..	14.7-	16.9	37.1	1½	...	..	1½	27.7
3-Still	7.7-	10.1	38.0	1½	2¾	9.2	4¼	27.8
3-Jolted ..	7.7-	10.1	38.9	1½	...	..	1½	27.5

Freezing point range, 27.4° to 28.0°F.; average, 27.7°F.

Inspection immediately after each test showed the contents frozen stiff throughout. Frozen sample when opened was of granular texture; on cooking, both frozen and unfrozen samples were of smooth texture.





Statistical Control Of the Production Process

PART II—Control charts assist the quality control engineer in deciding what has gone wrong with the process or what may go wrong with it. Charts for "defectives" tell when a machine such as a cherry pitter is out of control

By A. M. MOOD, Research Associate Professor
Statistical Laboratory, Iowa State College, Ames, Iowa

AFTER some experience with the control charts, the engineers will recognize certain patterns of points as meaningful. One pattern comes to be associated with one kind of deficiency in the process, another with another. A practiced quality control engineer, by merely glancing at the chart, can often say what has gone wrong with the process or what is likely to go wrong with it in a few hours. Recognizable patterns of points are a definite indication of trouble because a process in statistical control will give a purely random sequence of points on the control chart. A nonrandom sequence is generated by some assignable cause, and it is the function of research to discover and eliminate the cause. The research may be too trivial to be dignified by the name in most instances, but in some cases, elaborate experimentation may be needed to uncover an elusive disturbance in a complex process such as, for example, a fermentation process.

Some illustrations of non-random sequence are given in Fig. 1. The sequence labeled *A* has an upward trend. *B* has a cyclic trend. In *C* the points alternate too regularly above and below the central line. In *D* the points below the line occur too regularly in pairs. In *E* there are too many points above the central line; the number of points above and below the line should be about equal. In *F*, which has control limits drawn in, there are too many points away from the central line; about two-thirds of all the points should fall in the middle one-third of the band between the control limits.

Control limits could be calculated for all these non-random sequences, and the processes might be said to be in control with respect to those limits in a broad sense. But the processes are not in statistical control, and if the disturbances producing the non-randomness could be found and removed, the control limits would be much narrower and the products of the processes would be more uniform in quality. Of course new control limits would be computed for the process after any disturbances had been removed.

The rapid printing tabulator is one of the calculating machines used in dealing with quality control statistics. This machine will print selected data from punch cards, will add groups of data and will add the products and squares of numbers according to any pattern, established by the setting of switches and selectors.

Range Control Charts

Ordinarily the sample ranges are carried along with the sample averages on the same chart. This is illustrated by the lower sequence of points in the control chart on coffee weighing given in Part I. The average range for the 68 samples was 1.28, and this gives the position of the central line for the range chart. The upper and lower control limits for the range are given by multiplying the average range by the factors given in Table I.

In the present example where the sample size is five, the two factors are 2.11 and 0. The upper and lower control limits for the range are therefore:

$$\text{Upper limit} = 2.11 \times 1.28 = 2.70$$
$$\text{Lower limit} = 0 \times 1.28 = 0$$

The range chart is used just as the average chart is. When a point falls outside the control limits, or when the points form a non-random sequence, the process is assumed to be out of statistical control. In

some processes, it may be found that the range never goes out of control unless the average does also. In such cases the range chart may as well be discontinued, and only the averages charted.

Charting the Defectives

Many quality characteristics are not susceptible of measurement—the product is merely satisfactory or not satisfactory with regard to a particular specification. Thus, a package of a dehydrated food may or may not be properly sealed. For quality specifications of this kind, the number of defective items in each sample is charted.

Fig. 2 illustrates a chart of this type. The data were taken in checking a cherry-pitting machine. Samples of ten cherries were examined every fifteen minutes and the number of unpitted cherries in each sample was plotted. Control limits for charts of this kind are given by the formula:

$$\frac{D}{N} \pm 3\sqrt{\frac{D}{N}\left(1 - \frac{D}{nN}\right)}$$

where n is the sample size, N is the number of samples, and D is the total number of defectives found in the N samples. The plus sign gives the upper limit, and the minus sign the lower limit; the latter will usually turn out to be negative and would be replaced by O. In the example of Fig. 2, the limits were computed after the first 30 samples were taken. The total number of defectives in these 30 samples was 14. The limits are therefore given by

$$\frac{14}{30} \pm 3\sqrt{\frac{14}{30} \cdot \left(1 - \frac{14}{300}\right)}$$

or 0.467 ± 2.001

or 2.468 and -1.534

The upper and lower limits are taken to be 2.5 and 0. A sample containing three or more defectives would indicate the process to be out of control.

The process average is simply the proportion of defective items found in the N samples. This is given by D/nN, which in the present example is 0.0467 or 4.67 percent. The central line is, however, at the point given by multiplying the process average by the sample size. That is, the position of the central line is at D/N, which is 0.467 for the illustrative example. The central line is of much less value in these charts than in the charts on averages or ranges, and it is often left off the chart entirely. The reason for this is that the criteria given in connection with Fig. 1 above for non-randomness do not apply well to charts on the number of defectives. In particular, if the process average is quite small, then most of the samples will have no defectives, so that most of the points will necessarily fall below the central line. In such a case (small process average) the points will be mainly 0's with a few 1's and a very rare 2 now and then. The only useful basis for judging whether the sequence is random or not is the division of the 0's into groups by the 1's and 2's; thus if the groups of 0's are of about equal size, the sequence is probably not random.

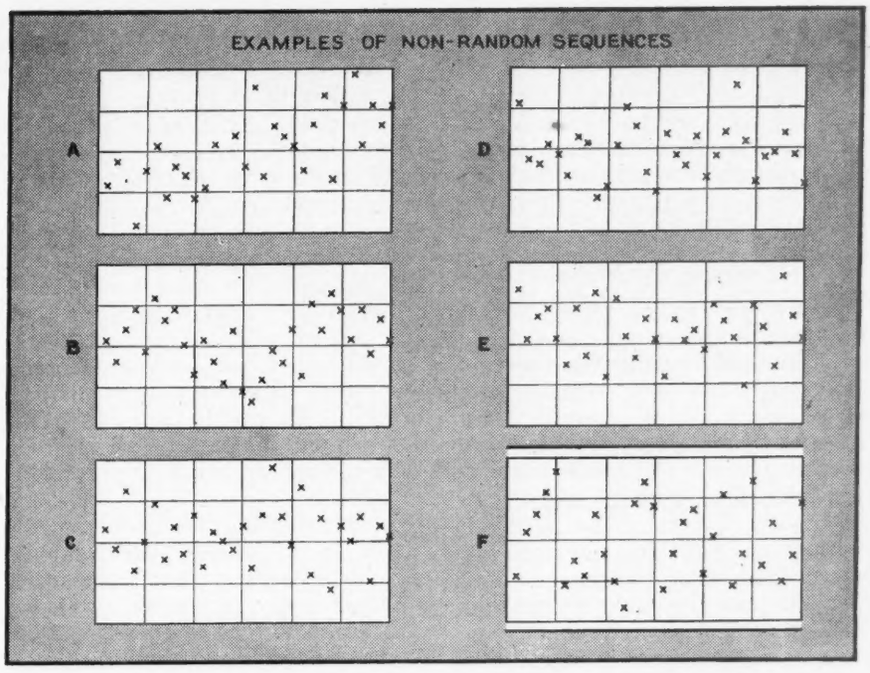


FIG. 1. Non-random sequences are illustrated in these six sample control charts. They indicate disturbances in production, which are significant in quality control.

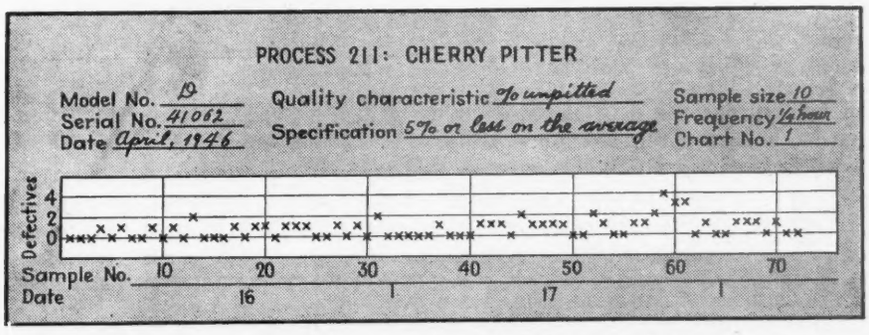


FIG. 2. For quality specifications that do not involve an actual measurement, a chart of defectives is useful. This one shows unpitted cherries in a test run.

Meeting the Specifications

After the preliminary data for a control chart have been taken and the control limits put in, it is possible to determine whether or not the product meets the quality specifications. The simplest way to do this is to draw specification limits on the control chart. The tolerances are not the proper tolerances for sample averages, but must be divided by the square root of the sample size. Thus, in the coffee weighing example, the quality specification was 32.5 ± 0.5 oz. net, or 34.5 ± 0.5 oz. gross. For samples of size 5, the corresponding specification limits on the sample averages are

$$34.5 \pm \frac{0.5}{\sqrt{5}}$$

or 34.5 ± 0.224

or 34.724 and 34.276

If these specification limits fall outside the control limits, the process is producing products that meet the specification; if they fall inside the control limits, the specification is not being met. Reference to the coffee filling control chart in Part I shows that the weighing machine is far from meeting the specification since the specification limits are well inside the control limits.

Sometimes the specification limits are put on the control charts as broken lines although many quality control engineers prefer to leave them off because points that fall outside the control limits but inside the specification limits are not apt to be taken seriously enough by the operators of the process.

Changing the Process

When the process fails to meet the specification even though it is in statistical control, then the process simply lacks the necessary precision and must be changed if the specification is to be achieved. There are two ways of improving a process. One way is to scrap some of the old equipment and replace it with more sensitive (and generally more expensive) equipment. This is sometimes the only feasible solution to the problem. In other cases it may not be possible at all. The other method is to make several minor improvements, which together will bring the required precision into the process. This solution usually requires considerable research and experimentation, and it is here that a professional statistician, working in collaboration with other research personnel and plant engineers, can be most useful.

When the process meets the specifications all too well—the specification limits are far outside the control limits—then one may assume he is using too expensive a process for the desired product. This process should not be wasted on such a product, but should be reserved for higher quality products. Or, if there is not a choice of this kind, effort should be directed toward reducing the operating costs of the process at the expense of some of the unneeded precision.

Quality Control Program

Experience has shown that it is better to begin a quality control program on a small scale and build it up gradually rather than to attempt to put a full-scale program in operation at once. One or two men are enough for a beginning. They would be engineers who would become quality control engineers as the program developed. They would do their own sampling and keep the control charts themselves until the procedures became standardized. At that time a few inspectors might be employed. More engineers and inspectors would be added to the staff from time to time as required by a natural expansion of the program.

In any plant, there are literally hundreds of quality characteristics and details of production processes that might be controlled. At first, however, one could select perhaps half a dozen of the more important steps in the production process and study them by the control chart method. It usually will be found that these processes are not in statistical control or at least go out of control rather frequently. For the first few months it is better to concentrate on these initially chosen processes, adjusting their quality levels, eliminating their disturbances, and becoming acquainted with the causes and cures of their failures.

In setting up the first control chart on a process, the samples should be taken rather frequently, perhaps every fifteen minutes or half an hour. The sample should be selected at random from the products made since the previous sample was taken. The sample should not be made up of the consecutive items made at the time the sample was drawn. The sample size is chosen more or less arbitrarily. It should not be too small (2 or 3) nor so large that the computations of the mean and range would be troublesome. Five is a very commonly used number. When only the number of defective items is to be charted, larger sample sizes are often used—ten or twenty or even larger if the proportion of defectives is to be be kept quite small. This question will be discussed in greater detail in a later article on quality determination.

TABLE I—Range Control Limits

Sample size	Upper limit factor	Lower limit factor
3	2.57	0
4	2.28	0
5	2.11	0
6	2.00	0
7	1.92	.076
8	1.86	.136
9	1.82	.184
10	1.78	.223

TABLE II—Notes Made by Quality Control Engineer
Process 47—Coffee Weighing

Chart no.	Sample no.	Date	Notes
1	18, 19, 20	4-17	Primary adjustment slipped.
1	34-41	4-18	Appeared low, cause not found.
		4-19	Bag weights were low on samples 35 to 41—about .4 oz.
1	72	4-20	First control limits computed—samples 17 to 20 omitted, .4 oz. added to samples 35 to 41. Specifications far exceeded.
1	91	4-21	Machine taken out of operation to be overhauled by manufacturer.
2	1	4-29	New chart begun after machine overhauled.
2	34	5-1	New control limits computed—process still fails to meet specification but only by a fraction of an ounce.
2	43	5-1	Specification temporarily revised to 32.6 ± .6 ounces net to avoid underweight bags. Adjustment changed from 32.5 to 32.6.
2	75	5-3	New control limits computed from last 33 samples. Process just meets new specifications.
2	91-92	5-4	Total production between times of samples 91 and 92 charted on auxiliary chart 2A. Large periodic effect evident.
3	26	5-7	Out of control—cause not found.
4	1	5-10	Periodic factor found to be caused by eccentric driver gear. Gear replaced.
4	28	5-11	New control limits computed. Very well inside specification limits.
4	35	5-12	New specification, 32.3 ± .3 ounces net, adopted. Adjustment level changed to 32.3

Frequency of Sampling

After the process has been brought well into control within satisfactory specification limits, the sampling frequency may be reduced perhaps to one sample per hour or every two hours. Exceptionally reliable processes might be sampled even less—two or three times per week in extreme cases, but in no case would the control chart be dropped altogether. It is much better to have at least a fragmentary record than no record at all when trouble does eventually develop in the process.

The method of random sampling described above (drawing the sample from all the items produced since the previous sample was drawn) has one defect that needs to be taken into account. It will conceal short term periodic disturbances. In order to detect any disturbances of this kind, it is well to make a complete investigation of all the products made during one sampling period. This is done best after the process has been brought into control by the random sampling method. One should measure every item produced during the period between two samples. These separate measurements should each be plotted on an auxiliary chart just as the sample averages are plotted on the regular control chart; they should be plotted in the order produced by the process. This auxiliary chart should be examined carefully for regularities of any kind, as exemplified in Fig. 1. If any are found, and the cause discovered and removed, the statistical control limits are revised after collecting a new batch of data, and will usually be much improved. After any such periodic disturbances have been removed, another auxiliary study should be made in order to find other periodic disturbances that may have been masked by those found first.

(*Turn to page* 222)

EDITORIALS

LAURENCE V. BURTON, Editor

Decontrol Board Acts

PRICE ceilings are back on meat, soybeans and cottonseed, and certain derived products, but they have been removed from milk and grains and their derivatives.

Nobody is pleased and it is doubtful if many will be benefitted. The Price Decontrol Board probably did the best it could in the short time allowed by Congress and under the peculiar instructions in the law restoring OPA and creating the Board. Without access to all the hearings and behind-the-scenes debates it is not possible to approve its decisions. Nevertheless blame for any fault lies more with Congress than with the Board, for Congress imposed the conditions for decontrol in the much debated Subparagraph (B).

Organized labor, entrenched behind the Wagner Law, demands restored ceilings or further wage increases. This is one place where Congress must discharge its full responsibility. Another is the parity price ratio under AAA. Subsidies granted, modified, or not restored, are other sources of confusion and headaches for industry, particularly where OPA has not yet granted price relief.

Price ceilings on meat without price ceilings on grain are as unlikely to be effective as were ceilings on meat without corresponding ceilings on livestock in the life of the first OPA law.

Low priced foods are not likely to be attained by conflicting methods, restrictions, impositions, and even license granted by Congress.

Employee's vs. Shareholder's Earnings

YOU ought to have these data for future reference. The annual report of U. S. Steel Corporation shows that on December 31, 1945, it had 225,822 shareholders (both preferred and common) while the average number of employees for 1945 was 279,274. The employees received an average weekly earning of $54.03, or about $2,710 a year. The year's take of the average employee was over ten times the $265 paid to the average stockholder.

If all wages and salaries paid were increased 18½ cents an hour the average annual increase would be about $400. Compare that with the average dividend per shareholder. And yet, the USW-CIO objected to an increase in the price of steel.

Comparable figures from the annual report of Standard Oil Company (New Jersey) show that there were 108,000 employees and 160,000 shareholders. The employees averaged $2,907 earnings compared to $426 dividends to the average shareowner.

You may want to work out comparable figures for your own company and present them to your employees, if they hold some fantastic notions about the profits of the business. The owners of a business are entitled to some return for the use of their money.

Soviet Postpones Peace

"SOVIET POLICY seeks measures which will prepare central European countries for incorporation into the Soviet system. This requires time and dictatorial authority. As long as no peace is signed, the Red army can be kept in the huge area of Russian occupation to dominate the defeated people who have no legal status or rights. Constant pressure, with no alternative offered, may bring them to Communism. For this reason the Soviet leaders have insisted on postponing the peace conference and have consistently obstructed efforts to write peace treaties in Europe."

Where do you suppose that quotation originated? It came from Labor's Monthly Survey, July, 1946, published by American Federation of Labor.

A Grievous Error

THE Cream of Wheat Corporation, in an effort to do an effective job of sales promotion in the retail trade, has aroused the opposition of the National Association of Frozen Food Packers. While Food Industries does not ordinarily get into a controversy between food manufacturers it appears to us that the public health angle justifies our support of the Frozen Food Packers' position.

Cream of Wheat got out "10 New Food Display Ideas" in which its No. 5 idea advocates open store display of frozen foods outside the freezer cabinet on the theories: that a mass display will remain frozen all day; and that people "buy frozen foods for use the same day" and, hence, if defrosting should occur it would make no difference.

While one may credit Cream of Wheat Corporation with the best of intentions, from the technological angle this advice to layman retailers is deplorable. It may lead to material harm to quality, to say nothing of possible spoilage and health hazards. Furthermore, it is based on the incorrect premise that thawing would be too slow to permit bacterial action, and in case the lot were not sold in a day that refreezing would not harm the quality. And on top of all this, certain alert municipal health officials already are cracking down on the practice erroneously recommended.

It is to be hoped that no serious harm will arise from the error.

Manufacturers Responsibility Goes Clear to Consumer

IN maintaining quality of frozen foods, the manufacturers' responsibility does not end with the freezing process. Ultimate success in the frozen food business depends on controlling quality during storage, distribution and merchandising. Too often, frozen food operators select top-quality raw materials and process them under exacting procedures set up by research and development, and quality control departments, only to learn from customer complaints that original product quality was not maintained to the time of purchase.

It is equally important that the manufacturer also study the changes of product quality in cold storage and set up maximum time limits for warehousing. Shelf-life time extensions can be made by proper technological studies.

More is known about how to freeze than about technics of product distribution. Far too many manufacturers ship their product with no further thought as to its condition when received by the company warehouse, or outside distributor or retailer. An otherwise excellent quality product may arrive in a completely or partially defrosted state. Subsequent refreezing, be it in a cold storage warehouse, refrigerator car or truck, or low temperature storage or display case, adversely affects product quality.

It is the manufacturers' safeguard to devise quality control standards, supplemented with frequent inspections, to insure quality after products leave the plant. Proper storage, distribution and merchandising are indispensable. They are the processor's goods until the consumer tears off the label. Distribution needs control.

The Crusade for Sanitation

RESTAURANTS, soda fountains and barrooms in New York have had a severe going over by the City Health Department in a campaign to enforce sanitation. The total fines for violations have gone as high as five figures in a single day. Offenders have been told to scrub in the old fashioned way if they can't buy automatic machinery. Some were closed until they cleaned up the premises.

Lest anyone regard this as outside our immediate sphere of activity let it be recorded that such campaigns for cleanliness have a way of sweeping the country, also that municipal health authority extends into factories as well as public eating places. Moreover, it could be that the sanitation drive by the Federal Food & Drug Administration is a potent influence in galvanizing state and local authorities into action.

The only point on which one could differ with the health authorities on plant sanitation is the often debated question of who should design the equipment. Medical men in municipal health departments too often insist on designing the sanitary features of equipment used in their jurisdictions, often incorporating design details that are needlessly expensive. Design engineers often contend they could attain the same objective at lesser cost if the medical authorities would merely specify the condition to be met, but not the manner of its attainment.

The design aspect is, however, subordinate to the larger problem of sanitation and cleanliness in all aspects of human food.

Let the good work go on.

Visit This Exposition

IF you can get to Chicago September 9 to 13 you will be repaid by a visit to the Coliseum to see the National Chemical Industries exposition held concurrently with American Chemical Society's 110th national meeting. At this exhibit you will see much equipment that is suitable for food manufacturing.

Nazi Food Technology

THE low state of food technology in Germany under the Nazis is revealed in British Intelligence Objectives Survey, Report 186, Item 22, from which comes the following. Dr. Rudolph Heiss, who attended the First Conference on Food Technology at Massachusetts Institute of Technology, 1937, explained German dehydration methods, saying that vegetables should be dried to 7 percent moisture or below, or compressed at a moisture content of 12 percent. In practice, the vegetables were dried to 8 to 12 percent moisture, then allowed two or three months in which to reach equilibrium with atmospheric moisture before pressing.

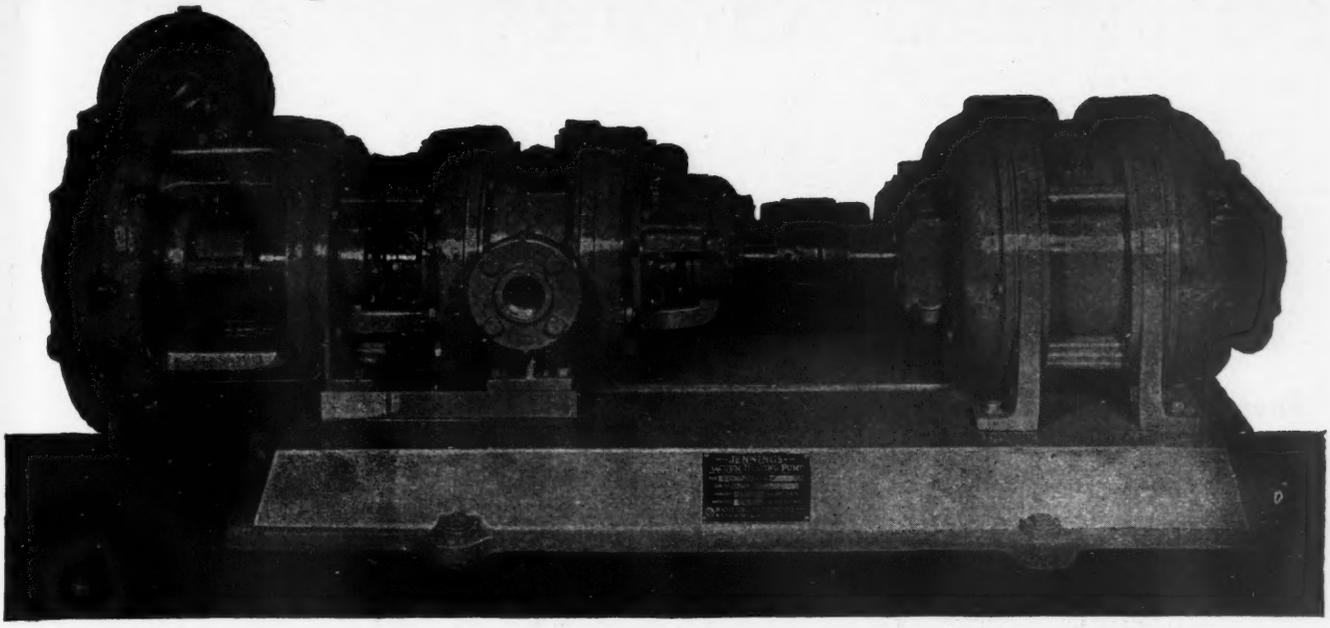
Heiss explained that the administrators from the Wehrmacht and the Hauptvereinigung der Deutschen Gartenbauwirtschaft permitted such high moisture content because wheat and flour did not go moldy at 14 to 15 percent moisture and hence there was no reason to anticipate that dehydrated vegetables would deteriorate at these moisture content levels!

The Sand Tolerance

The Wehrmacht's specifications for quality of raw materials are also revealing: "A sand content of more than 0.3 percent in the vegetables (with the exception of spinach) points to insufficient cleansing and must be objected to. A sand content up to 1.0 percent is permissible with spinach. The maximum sand contents allowed for the following are stated: Beansavory 3 percent, Estragon 2 percent, Garlic or leek 2 percent, Marjoram 5 percent . . . "—but why go on?

"Moisture content of the dried product must not exceed 14 percent, and with onions, 15 percent."

Nash—the Perfected Vacuum Pump for Evaporators and Condensers

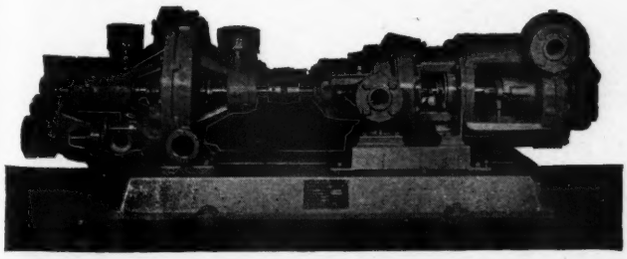


COMBINATION VACUUM REMOVAL UNIT ESPECIALLY DESIGNED FOR SATISFACTORY OPERATION ON CONDENSERS WITHOUT BAROMETRIC LEG

Especially designed for drawing air and liquid from high vacuums, the Nash Vacuum Removal Unit is an efficient combination of a standard Nash Vacuum Pump and a Jennings Centrifugal. This design may be had in either motor or steam turbine drive, and may be installed with confidence that it will operate perfectly.

Nash Vacuum Pumps for Evaporator and Condenser Service offer unusual advantages. Vacuum is non-pulsating, producing uniform operating conditions and assuring a better product. Nash Vacuum Pumps have no valves, gears, pistons, rings, or mechanical complications. The single moving element rotates without metallic contact, and no internal lubrication is required. In standard design these pumps maintain vacuums up to 27" of mercury.

Nash Pumps are compact, and require but a fraction of the space taken by old type equipment. They may be installed where convenient, and they operate at suitable speeds for direct connection to either electric motors or steam turbines. Nash engineers will be glad to recommend proper equipment to exactly meet your particular requirements.

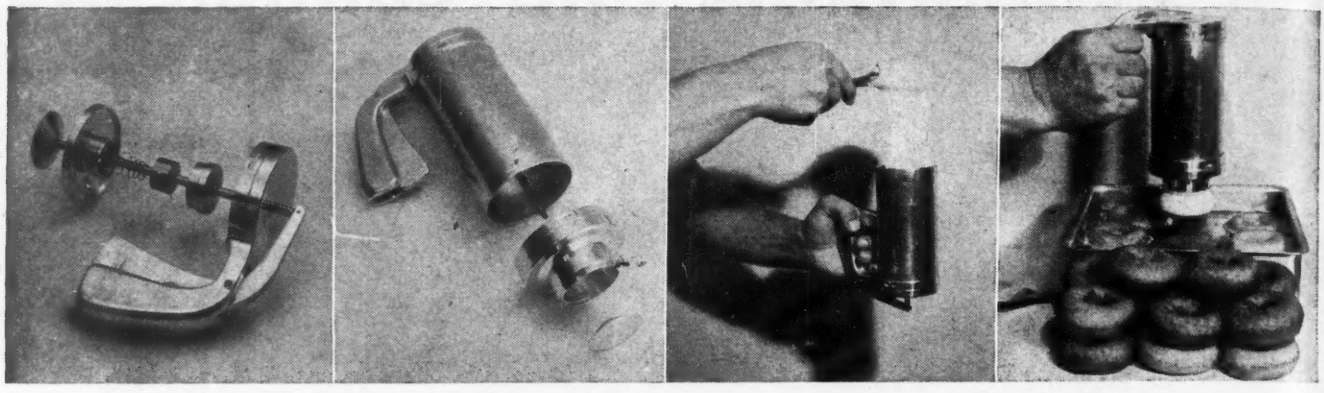


THE NASH VACUUM REMOVAL UNIT MAY BE HAD EQUIPPED WITH STEAM TURBINE DRIVE WHERE THIS TYPE IS PREFERRED

NASH ENGINEERING COMPANY

SOUTH NORWALK • CONNECTICUT, U. S. A.

NEW PACKAGES & PRODUCTS



Speedy Donuts

WHILE approximately $150,000,000 worth of doughnut mix was sold in the United States last year, distribution in the retail market was limited.

Now, Homade, Inc., Berkeley, Calif., has put up a 1-lb. package of Prest-O-Mix and is marketing it with the aid of a novel but practical mechanical doughnut former.

The Prest-O-Gun is an eight-piece aluminum and stainless steel device large enough to hold batter for 2 dozen doughnuts. It is said to virtually clean itself as the last of the dough is pressed out, allowing for a minimum of waste. The company states also that the batter may be refrigerated in the gun and used as desired.

The firm plans to retail the gun at about five dollars. It has made a 5,000-unit trial run of the machine for distribution in the San Francisco bay area. Distribution on a national scale will follow.

Prest-O-Mix, containing enriched and soya flours, sugar, spice, baking powder and shortening, requires only the addition of water.

It is packed in a sealed end carton, which carries information about Prest-O-Gun as well as Prest-O-Mix. The gun is packaged in a container of similar design. Colors are yellow, blue, red and white.

Form Fitting Fillets

BOUND to catch the consumer eye is the package designed for the Great Atlantic and Pacific Tea Company's quick frozen fillets.

The wax-coated carton, sized like an average fillet, is 8½ in. long, 3 in. wide and 1¼ in. deep. It has a top flap opening and locked ends.

The attractive paper labels double for folder inserts containing cooking directions and recipes. A transparent overwrap holds the label in place on top of the carton.

The color scheme for Cap'n John's Flounder, Haddock and Cod Fillets is red and green on a white background, while Pole Star Quick Frozen Mackerel and Rosefish Fillets use a royal blue ground with white printing.

Each box holds an average 3 to 4 servings.

A & P presently is incorporating frozen food cabinets in its stores.

Trout Talk

A DE LUXE sandwich or hors d'ouevre spread to please the gourmet's palate is to be had in a recent introduction of High Valley Farm, Colorado Springs, Colo.

Eugene Lilly, owner of the farm, has combined trout with butter, eggs, milk, flour, salt and spices to make a smooth, cream-colored paste that spreads easily.

Each 3¾-oz. can is said to contain one rainbow trout that weighed ⅓ lb. before dressing, smoking and processing.

Pate of Smoked Rainbow Trout comes in a key-opened tin with a white and black pasted paper label. The product has the approval of the Department of Game and Fish, Private Parks and Lakes, of the State of Colorado.

Bran Added

BISQUICK, one of the oldest of the prepared mixes, has been replaced during the flour emergency by a new Bisquick with Bran.

A smaller, 1-lb. 4-oz. paper-covered package is used. The color scheme is still red and white with touches of blue.

Product of General Mills, Inc., Minneapolis, Bisquick with Bran is a blend of enriched bleached flour, bran, vegetable shortening, sugar, dextrose, non-fat dry milk solids, phosphate baking powder and salt.

For Soups and Seasonings

LATEST additions to the line of vegetable flakes processed and packed by Little and Co., Inc., Chicago, are Little's Sweet Peppers and Mixed Vegetables.

In preparing the products, fresh vegetables are cleaned, chopped and dehydrated. The food is then packed in American Can Co. fibre cans with

BUILD BRAND ACCEPTANCE WITH YOUR CAP DESIGN

1. **PREPARE YOUR PACKAGE NOW** for tomorrow's stiff competition. Give it a colorful, distinctive cap design that not only will stimulate "impulse" sales, but will . . .

Delta OK

DELTA BRAND

Delta BRAND

Delta Brand

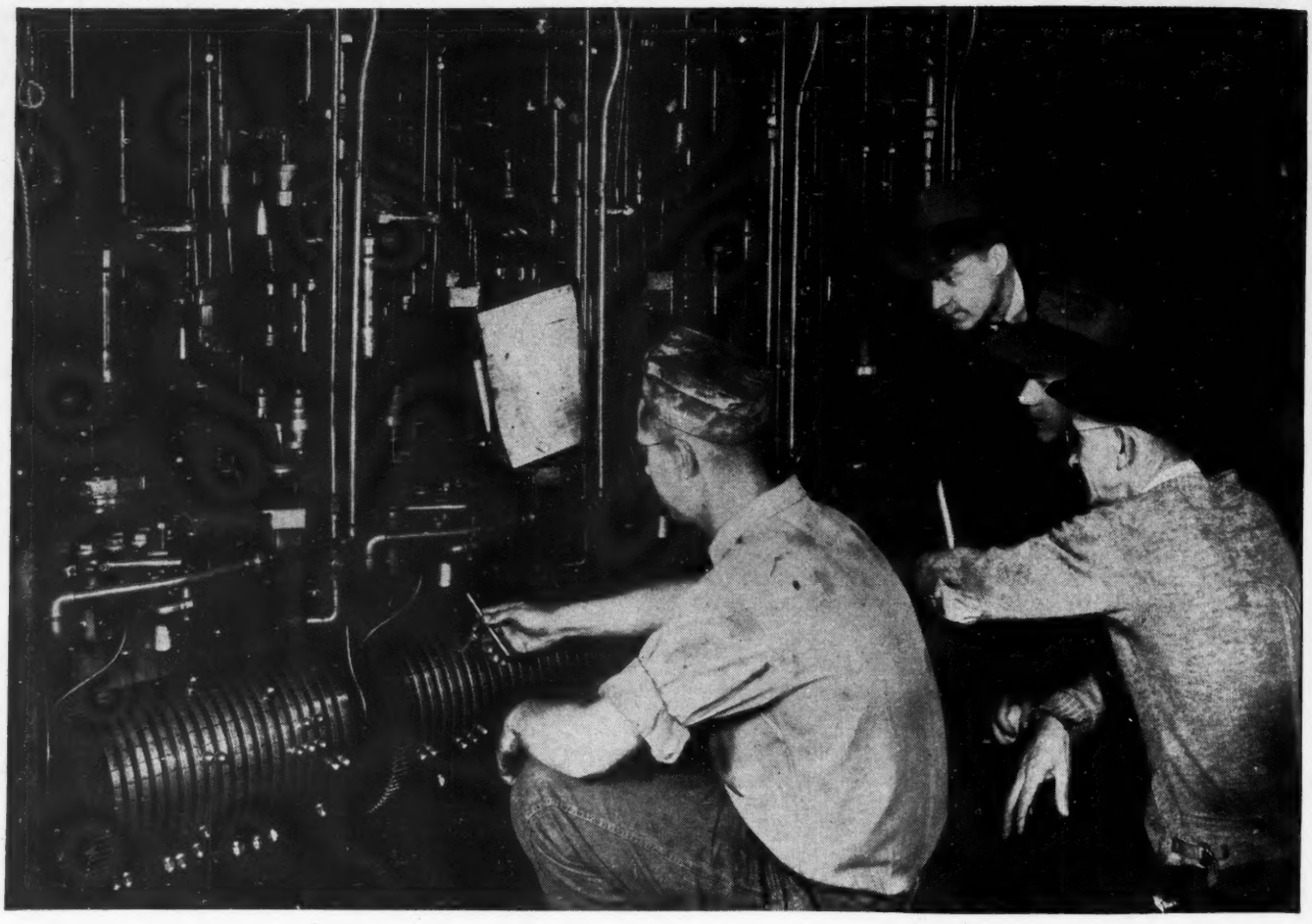
2. **INCREASE FAMILIARITY WITH YOUR BRAND** by placing your name before your customers' eyes . . . in the store . . . and every time your package is used in the home. Putting . . .

3. **A BRAND-SELLING DESIGN** into that free advertising space on your caps is an Armstrong specialty. Why not let them put your caps to work selling your brand now?

TO GET DESIGN SUGGESTIONS, simply send a sample package and product information to Armstrong Cork Co., Glass and Closure Div., 4209 Prince Street, Lancaster, Pa.

Armstrong's Closures

TURN STANDARD CONTAINERS INTO STANDOUT PACKAGES



"More ways to make a bottle than you can count"

You're watching Cy Robinson set the timing drum on a bottle-making machine in Armstrong's Millville, N. J., glass plant. Bill Herman, shift foreman, is giving a couple of Armstrong's salesmen an idea of the knowledge, training, and skill behind this operation.

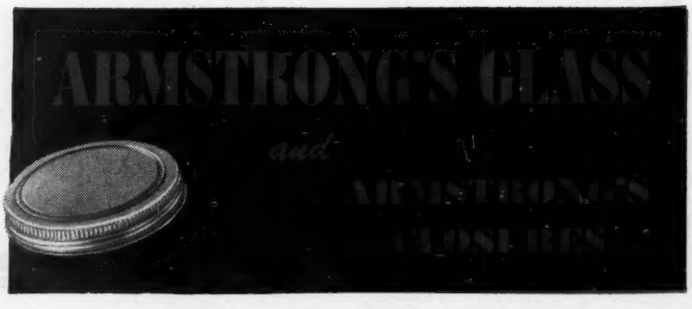
"Each of these timing drums," Bill is explaining, "consists of 19 rings. Each ring has 320 settings on it. Figured out mathematically, there are more ways to set the drum than you could ever possibly count!"

With such a tremendous number of settings possible, it is easy to understand why years of research and experience are required to arrive at the most efficient combination for each bottle. Many of the techniques involved in making top-quality glass are similarly complex.

It's easy to understand why everywhere they go in Armstrong's plants, Armstrong's salesmen find veteran workmen on the job. Men like Cy and Bill, who combine 53 years of glassmaking experience.

From these men, our salesmen get more than an insight into the fascinating difficulties of good glass and closure production. They acquire also practical, down-to-earth information that helps them do a better job of servicing your glass and closure needs.

For complete information about Armstrong's Glass and Closures, see your Armstrong's representative, or write direct to Armstrong Cork Company, Glass and Closure Division, 4209 Prince Street, Lancaster, Pennsylvania.



metal plug top. Institutional and 4-in. No. 11 sizes are used.

New and colorful labels have been designed for these items and will gradually be used for other dehydrated products made by Little. The basic scheme consists of a yellow background with natural colored vegetables—whole and chopped—scattered around all sides. A red circle with white printing carries the necessary identification.

Little and Co. also has announced its entry into the consumer canned food field.

Meat for Little Ones

BABIES and young children have received the attention of Swift and Co., Chicago, in the development and testing of canned all-meat baby foods.

The products have gained consumer acceptance and now are going into full distribution, aided by a heavy advertising campaign.

Beef, veal, lamb, pork, heart and liver are the six types of meat offered, as strained foods for babies and diced for juniors.

Meats for babies are hand-trimmed and passed through a fine mesh screen. Fat content averages less than 4½ percent and the products are vacuum packed in natural juices in 3½ oz. tins. enough for two average servings.

For juniors, the meats are diced so that each piece is about a ⅜-in. cube, being sufficiently resilient to encourage chewing. A touch of salt is added and a tin holds 5 oz.

The labels are red and white and blue and white, respectively, with colorful cartoon figures doing antics across the front. Directions for serving are given on the back.

These new products carry the seal of approval of the American Medical Association's Council on Foods and Nutrition.

For Fresher Chips

A BAG that keeps potato chips fresh longer and at the same time, reduces breakage to a minimum, has been developed by Thomas M. Royal, Philadelphia.

The two-in-one container is a 1-lb. bleached kraft bag printed in three colors. It holds two ½-lb. laminated glassine packages. This is to the consumer's advantage as she does not have to open the second bag until the first is used, keeping the chips crisper and fresher in their moistureproof wrap.

Another Mix

THE SIMPLE SIMON foursome of Burry Biscuit Corp., Elizabeth, N. J., is now a quintet. The company's Bran Muffin, Corn Muffin, Easy Biscuit and Pie Crust Mixes have moved over to make room for the new Burry's Simple Simon Gingerbread Mix.

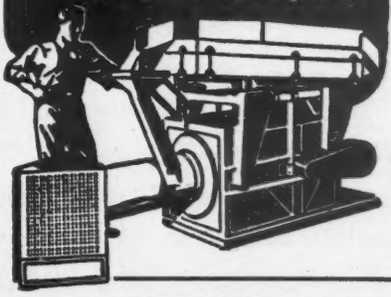
Flour, sugar, molasses, shortening, skim milk powder, leavening,

Swift's Meats FOR BABIES Strained BEEF
Swift's Meats FOR BABIES Strained PORK
Swift's Meats FOR BABIES Strained LAMB
Swift's Meats FOR BABIES Strained VEAL
Swift's Meats FOR BABIES Strained CALF HEART
Swift's Liver FOR BABIES Strained BEEF LIVER
Swift's Meats FOR JUNIORS Diced BEEF
Swift's Meats FOR JUNIORS Diced PORK
Swift's Meats FOR JUNIORS Diced LAMB
Swift's Meats FOR JUNIORS Diced VEAL
Swift's Meats FOR JUNIORS Diced CALF HEART
Swift's Liver FOR JUNIORS Diced BEEF LIVER

Stray Bronze

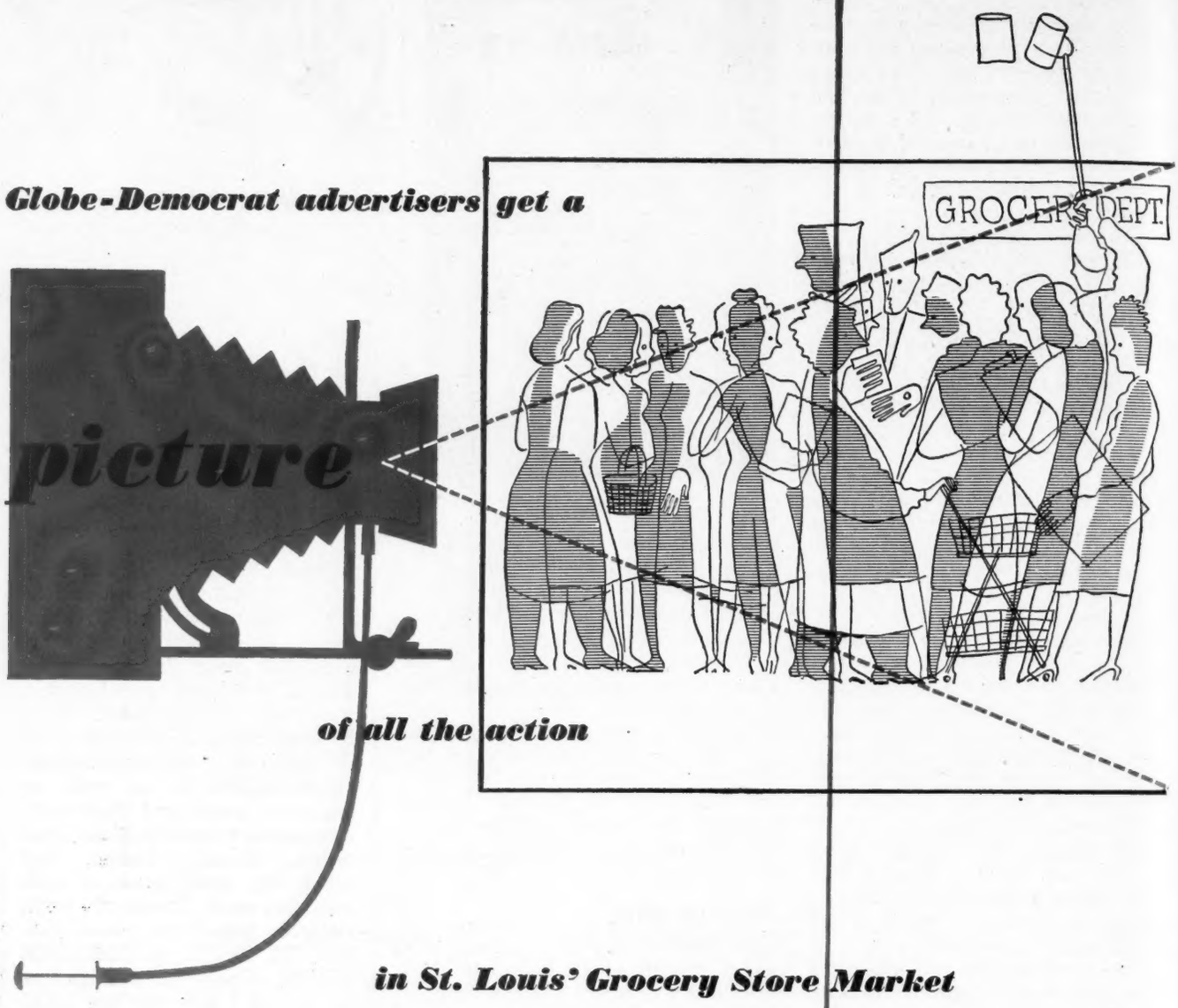
• Yes! And that piece of stray metal should not be found in your finished product! To eliminate this headache of the cereal and other dry food processors, we have developed a new type stoner better than 99% efficient! Revolutionary in design, it removes stones, glass, NON-MAGNETIC as well as magnetic metal, and other hard, dangerous contaminations from wheat, cereals, beans, and other dry food products with amazing ease. Compactly built, requires little floor space. CAPACITY UP TO 16 TONS PER HOUR! Operation cost as low as 3/5 of 1 H.P. per ton hour! Write for Bulletin FI-946.

SS&S AIR-FLOAT STONER



SUTTON, STEELE & STEELE, INC.
DALLAS, TEXAS
In Canada—Kipp Kelly, Ltd., 68 Higgins Ave., Winnipeg
Foreign—Separations Engineering, Ltd. 133 Bush House, Aldwych, London

Globe-Democrat advertisers get a



in St. Louis' Grocery Store Market

In St. Louis, it's a snap to see what's going on in the grocery store market.

As a *plus* service to its advertisers, the St. Louis GLOBE-DEMOCRAT offers a remarkable Retail Grocer Audit which is continually focused on 450 products in 27 grocery store classifications. Recording the inventories and sales, this GLOBE-DEMOCRAT survey has pictured the developments in this rich market for the past 3 years. With it, you can preview and review the effects of price, packaging, merchandising and advertising . . . for both your product and your competitors'.

What to get in this picture? Just write to us.

. . . and did you know that more than [redacted] of the St. Louis Market is outside the City Limits?

That means you really have to "get around" in the St. Louis area. And you can. Just come along in the St. Louis Globe-Democrat . . . it's the city's only daily that even claims to cover successfully the surrounding area (the 49th State) . . . 87 rich counties in Eastern Missouri and Southern Illinois.

St. Louis Globe-Democrat

eggs, salt and spices are mixed and packed 14 oz. to a box. This is enough for an 8x8 in. cake or a dozen cup cakes. It is suggested that raisins, nuts or chocolate drops be added to the batter to make tasty drop cookies.

The package follows the same basic design as its four predecessors. The box is a solid deep green with white printing and a three-color reproduction of the familiar Simple Simon figure holding a square of gingerbread.

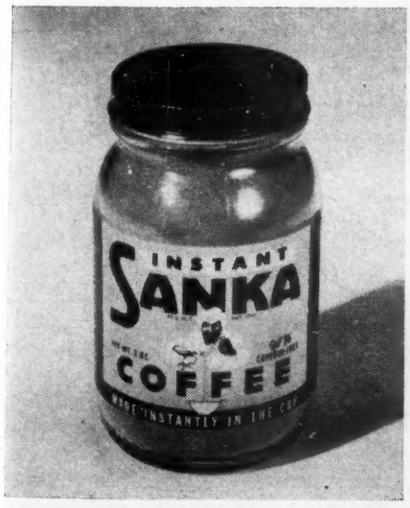
No Sleepless Nights

THE 97 percent caffein-free Sanka coffee, product of General Foods Corp., New York, now appears in soluble form.

Instant Sanka presently is being introduced through extensive advertising media and grocery store display.

This coffee product is soluble in both hot and cold water.

For household use, it is packed in a 2-oz. glass jar with screw cap and yellow and brown label. One-cup packets are provided in a display container for restaurant and other institutional uses.



Greater germ-killing power yet absolutely SAFE!

that's

ROCCAL
BRAND
Sanitizing Agent

Kills bacteria . . . inhibits growth of molds, slimes and algae

When you buy your first bottle of ROCCAL, you will have taken a great step forward in solving your sanitization problem. ROCCAL is a powerful germ killer . . . much more potent than the germicides now in general use. Yet ROCCAL in recommended dilutions is non-poisonous, virtually odorless and tasteless. It is non-corrosive—will not injure equipment or irritate operator's hands. Contains no phenol, active chlorine or heavy metals.

ROCCAL is accepted by over one hundred and seventy-five public health authorities. It is sure, safe, economical. It is the germicide of tomorrow ready for your use today.

Free Sample and Literature on Request

COLD STORAGE AND LOCKER PLANTS
Reduces spoilage losses by keeping refrigerators and lockers sanitary. Does not affect odor or taste of food.

FOOD PROCESSING PLANTS
Keeps equipment and storage areas sanitary. Inhibits growth of molds, slime-formers and iron bacterial growth.

FISHERIES AND FISH PACKERS
For sanitizing interior storage areas of fishing boats, storage tanks in canneries, filet machines, shrimp deveiners, etc.

Industrial Division

WINTHROP CHEMICAL COMPANY, INC.
Dept. W-16, 170 Varick Street, New York 13, N. Y.

THE VITAL TEN-THOUSANDTHS OF AN INCH

Viscosimeter for ascertaining the proper viscosity or "flow" of an enamel or lacquer.

Your reputation, and that of your product, often depend upon a coating of enamel or lacquer measuring only a few ten-thousandths of an inch in thickness . . . that thin film inside the can may spell success or failure. Chemical composition, adherence, special resistance to certain products, impermeability, freedom from taste . . . are but a few of the factors entering into the choice of the proper coating.

Crown Can Company chemists, through modern research and years of experience assure you that your can coating will be right for your product. But Crown service does not stop with the choice of the proper coating . . . of course, it proceeds to assure you that it will be applied at the right viscosity, assuring a uniform flow on the sheet metal.

CROWN CAN

THE NATION'S THIRD LARGE SOURCE OF SUPPLY

CROWN CAN COMPANY • PHILADELPHIA • Baltimore • Chicago • St. Louis • Houston • Orlando • Fort Wayne • Nebraska City

FOOD INDUSTRY NEWS

GENERAL

Shortage of Fats and Oils Reviewed by House Committee

USDA officials estimate supply will be down 600,000,000 lb., in 1947, with little prospect of immediate relief

THE seriousness of the fats and oils situation was brought into the open by O. W. Herman, acting director of PMA's fats and oils branch, in his testimony before the House Special Food Committee, early in August. The prospective shortage for 1947 was placed at 600,000,000 lb. by the Department of Agriculture officials. The shortage is worldwide and no relief is expected until late 1947, when next year's domestic production reaches the market.

Supplies available to this country are down both because of curtailed production at home and curtailed imports from foreign sources. Domestic production this year is off an estimated 560,000,000 lb. This changes the position of the U. S., which is normally a net exporter of about 290,000,000 lb., to a net importer of nearly 270,000,000 lb.

In a drastic attempt to bring about a balanced position, the government has announced that, with few exceptions, exports to foreign countries will be cut off next December 31. The exceptions, which will not amount to important quantities, will be for the purpose of providing exchange for high lauric acid oils from the tropics, to support foreign purchase programs for strategic materials such as rubber, and to provide for those countries that historically have been supplied by the U. S.

This country is experiencing its period of most acute shortage right now and no relief is in sight until the next crop of vegetable oil reaches trade channels. The whole situation could become much easier if some purchase agreement could be made for linseed oil from Argentina. Russia has been trying to buy Argentine linseed oil for edible use, payment to be made in ore, machinery or gold. Apparently they are bidding at prices that this country is unwilling to meet. The Russians, however, have not received any Argentine linseed oil. The South Americans do not want gold, and the Russians cannot deliver machinery. There is also a suspicion that they would have great difficulty in delivering any quantity of metallic ores. The picture is further complicated by the interests of the British, who are willing to pay the Argentine price. The British take the position that since they need the oil, they will pay for it.

Word from South America, in mid-August indicated a complete breakdown of U. S. government negotiations to purchase linseed oil and flaxseed from Argentina. There is little probability that we will be able to get any from that source. The result will be to hold back production in this country for a year of items needing linseed oil and enable foreign competition to recapture many markets they lost during the war.

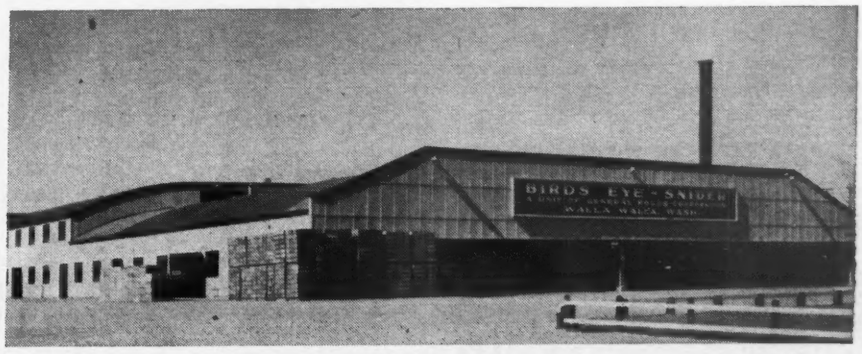
Fat users in this country are not getting the customary relief that may be expected from a large run of hogs. Normally when the movement of hogs slaughtered is well above average, the market will not absorb all of the fat-backs. The excess finds its way into the lard kettle causing the production of lard per hundred pounds of live weight to go up. The downward trend of lard production per hundred pounds live weight that has been experienced during the heavy run of July and August is due to relief shipments going to Europe.

Any estimate of the future supply of fats and oils must take into consideration the international political situation of which it is a part. This country in its zeal to promote goodwill by shipping food for alleged relief purposes has tipped the domestic price pattern out of line in favor of wheat and corn. Acreage of these grains has increased at the expense of soybeans and particularly of flax.

Short Crop

Last year's crop of cotton was the smallest since 1885 according to the USDA. The crop this year will be but slightly larger, with cottonseed production estimated at only 3,781,000 tons, assuming the ratio of lint to cottonseed to be the same as the average for the last five years. This estimated figure is about a third less than the average production for the last ten years.

The only item on the plus side of the ledger to be found in mid-August was the signing of the Copra Purchase Agreement with the Philippine government, by which the entire surplus of copra and coconut oil will be sold to this country for the year beginning July 1, 1946. The USDA reports that "shipments of copra and coconut oil in terms of copra have risen steadily since January, reaching a high of about 60,000 tons in July, almost equaling prewar tonnages." However, the department in reviewing the national food situation reported, "There is little prospect for a significant improvement in the civilian supplies of food fats in the coming months."



QUICK-FREEZING PLANT

Birds Eye-Snider's new plant at Walla Walla,, Wash., is one of the most modern quick-freezing food plants in the world. Begun in October, 1945, the plant is now in full operation. Power lifts unloaded the boxes of peas stacked at left center.

Wide World

THE THREE "DEACONS"

Conceived as a compromise on the politically "radioactive" issue of price controls, the Decontrol Board followed the pattern on August 20, by compromising on its first five decisions. Meats, cottonseed and soybeans went back under control, dairy products and grains remained free. Free grains and controlled livestock prices just can't work, according to the meat packers. And why meat, a shortage of which was only anticipated, should go back under control, while dairy products, which were never adequate, remain free is not clear. The board, headed by Roy L. Thompson, New Orleans banker (center above), George H. Mead, Dayton, O., paper and pulp manufacturer (left) and Daniel W. Bell, Washington banker and former Under-Secretary of the Treasury, also directed that the $684,000,000 livestock subsidy be resumed to absorb part of the meat costs.

Willis Sees Recontrol As Wholly Impractical

"FROM the point of view of both the public and the food industry the decision of the Decontrol Board to return livestock, meats and shortening to price ceilings is ill-advised and most unfortunate," Paul S. Willis, president of Grocery Manufacturers of America, Inc., said in a statement issued shortly after the Decontrol Board's decision was announced in Washington.

"Undoubtedly the new board, which was picked to make a decision, tried to arrive at a fair and honest policy, but like so many government orders, this decision is not in the public interest because it is impractical.

"The Decontrol Board seems of the opinion that the OPA can enforce June 30 price ceilings on meats. Looking back at the record this seems the height of wishful thinking. During the months just prior to the end of OPA, it was common knowledge that about 90 percent of all meat sold was diverted from legitimate trade channels and sold in the black market. We had the OPA then, but it was apparently either indifferent or unable to control the black market. By what magic will they now prevent a return of the black market? One serious aspect of the return of the black market and orchard slaughtering is the loss of critically essential fats and oils. The black marketeer has neither the facilities for recovering these fats nor has he an interest in preserving them.

Many Ramifications

"In order to understand the wide ramifications of the recontrol order on meats and shortenings," Mr. Willis continued, "it must be remembered that our national food economy is complex and closely interrelated. The products of one manufacturer are the ingredients of another. There are about 4,000 items in a good sized grocery store. Practically all of them are made in whole or in part from a few basic commodities. Thus, the control of meats and fats and oils will be seriously felt in the baked goods, margarine, soup, dessert, and many other industries.

"It is difficult to estimate the damage done to the food industry by the off-again, on-again policy of the government on price controls. Throughout the spring, there was a period of doubt as to whether or not Congress would continue the OPA. Then came a month during which we had a complete control holiday. This was followed by a month of partial controls, and we are now entering a period of recontrol. Under such conditions, it is nearly impossible for grocery manufacturers to plan ahead intelligently.

"The Decontrol Board is to be congratulated on its realistic and farsighted decision to remove controls from dairy products and grains. It is to be hoped, however, that the OPA will quickly clarify some of the confusion arising from the decision as announced. It has been amply demonstrated that the unrealistic policy of allowing raw material prices to advance while holding finished products under rigid ceilings inevitably results in curtailment of production."

Baking Cost Report Released by F.T.C.

THE second part of Federal Trade Commission's study of the wholesale baking industry has been completed and the results released. Part II is entitled "Costs, Prices, and Profits."

Immediately available is a brief summary of a dozen pages. Later the full text of the elaborate document will be printed.

DOUBLE BOXCAR

The new Boeing Stratofreighter has nearly twice the volume of an average boxcar. Carrying 41,000 lb., this double deck, four-engine, all-cargo plane can make 20 trips across the U. S. while the boxcar is making one. It will have both refrigerated and warmed compartments and can be loaded from four trucks simultaneously.

Pioneering in the making of
ADHESIVES THAT WORK

"It is a pleasure to deal with a company that is cooperative and dependable"

On the adhesives for the folding paper boxes here illustrated —manufactured by the Empire Box Corporation of Garfield, New Jersey—Mr. S. L. Neidorf, Treasurer, writes:

"We have been a satisfied Arabol customer for more than twenty years. It's a pleasure to deal with a company that is so cooperative and dependable—particularly in these days. We like your service, the way you handle our problems, and the way your adhesives provide a minimum of waste while giving us a maximum of efficient operation. We would like to take this opportunity to wish you the continued success you deserve."

The Folding Box Glue used by Empire Box Corporation is a clean operating adhesive. It is odorless, gives good mileage and works particularly well on Staude machines. Other Arabol Folding Box Adhesives with equally high workability and economy are expressly made for International Machines.

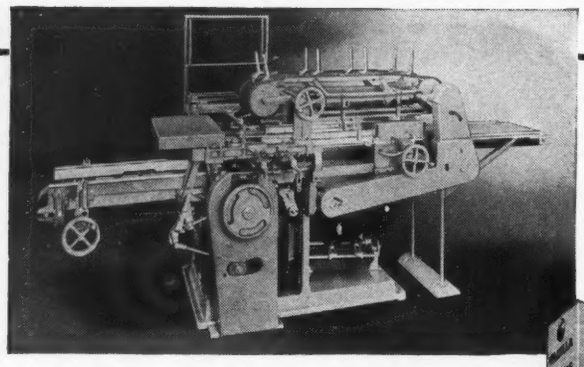
Why not investigate the benefits from Arabol Adhesives and service? Test them at our expense. See the Arabol Representative when he calls. He knows adhesives.

THE ARABOL MANUFACTURING CO.

Executive Offices: 110 East 42nd St., New York 17, N. Y. CHICAGO—54th Avenue & 18th Street
SAN FRANCISCO—30 Sterling Street • *Branches in Principal Cities* • *Factories in Brooklyn, Cicero, San Francisco*

Adhesives?... ARABOL!

Here's why the New Model FA is such an outstanding favorite



The FA combines numerous features which increase package appeal and greatly reduce wrapping costs

Quickly adjustable for various sizes

Because it provides flawless, high-speed wrapping for a wide variety of products, sales of our new Model FA have been mounting steadily. Here are but a few of the many desirable features which have made the new Model FA such an outstanding favorite:

Wraps up to 100 packages per minute — making it possible to maintain production schedules with fewer machines.

Only one operator — keeps labor costs at a minimum.

Quickly adjustable for many sizes. In some plants an entire line of products is wrapped on a single FA machine. All necessary adjustments can be quickly made by the operator.

Can be adapted to any wrapping material. Permits unlimited freedom in designing the most appealing package for your product.

Registers all printed matter with unfailing accuracy. A highly perfected electric eye insures uniform neatness, regardless of the length of the run.

Smoother, quieter operation. Reciprocating cam motions have been eliminated wherever possible, thereby reducing noise, and greatly extending the life of the machine.

Consult our nearest office for more complete information and literature on the new Model FA—the fast, versatile, thoroughly modern wrapping machine.

PACKAGE MACHINERY COMPANY
Springfield 7, Massachusetts
30 Church St., New York 7 • 111 W. Washington St., Chicago 2
101 W. Prospect Ave., Cleveland 15 • 849 Marietta St., N. W., Atlanta 3
443 S. San Pedro St., Los Angeles 13 • 320 Market St., San Francisco 11
18 Dickens Ave., Toronto 8

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

Merger of Biscuit Firms Unites Two Companies

CONSOLIDATED BISCUIT CO., Chicago, and J. B. Carr Biscuit Co., Wilkes-Barre, Pa., completed plans recently to consolidate into the Carr-Consolidated Biscuit Co. The merger will be submitted to stockholders for approval at special meetings in September. The new organization will be the fourth largest company in the cracker and cookie field with aggregate sales of $25,000,000.

Consolidated Biscuit Co. has plants in Chicago, Louisville, Ky., and West Roxbury, Mass. J. B. Carr Biscuit Co.'s plants are located in Wilkes-Barre, Pa., Peoria, Ill., Detroit and Greenwood, S. C., with one under construction in St. Louis. Guido Rahr, chairman of the Consolidated Biscuit Co., will be chairman of the new company. J. B. Carr, president of the Carr Biscuit Co. will become president of Carr-Consolidated, and R. C. Bristow, president of Consolidated Biscuit Co., will become vice-president and treasurer.

Flour Mills Realign For Lower Extraction

ONE of the largest experiments ever made with bread was ended Sept. 1 when restrictions on flour extraction rate were removed. Most of the mills were realigned Labor Day week for an extraction rate of 72 percent, or less indicating millers and bakers are proceeding on the assumption that Mrs. Consumer, as is usually the case, will again buy taste and appearance, instead of nutritional value.

The high extraction program went into effect in the spring without undue difficulty. Trouble with the new crop wheat was, however,

Which is Easier to Handle?

The Answer is one of 11 reasons Why You Should Use

MM&R SPICE OILS for MODERN FLAVOR CONTROL

Of course, it's easier to handle a 1 lb. bottle of Oil Coriander than 200 lbs. of Whole Coriander. And it's not only *easier to handle,* but *more economical*—because that 1 lb. bottle contains the equivalent flavor-strength of 200 lbs. of whole spice.

And that's not all—liquid spice oil mixes into batch or brine and provides uniform distribution of wholesome flavor without color disturbance . . . without any danger of product contamination.

These are just a few of the 11 reasons why more and more producers of food products are switching to Spice Essential Oils . . . *the M M & R brand* . . . pace-setter in the field of Spice Oils for the food industry.

1. Uniformity of quality and flavoring
2. No color disturbance
3. Less bulk in storage
4. Less weight in shipping
5. No danger of molding
6. No loss by exposure in package while being stored
7. No starch introduced into your mixture
8. Ease of handling
9. Less cost as compared to equivalent spice value
10. Entire flavor available immediately
11. Elimination of the possibility of dust and dirt

Send for "Table of Equivalents" Showing Comparative Flavoring Strengths of Whole Spices and Spice Oils

MAGNUS, MABEE & REYNARD, INC.

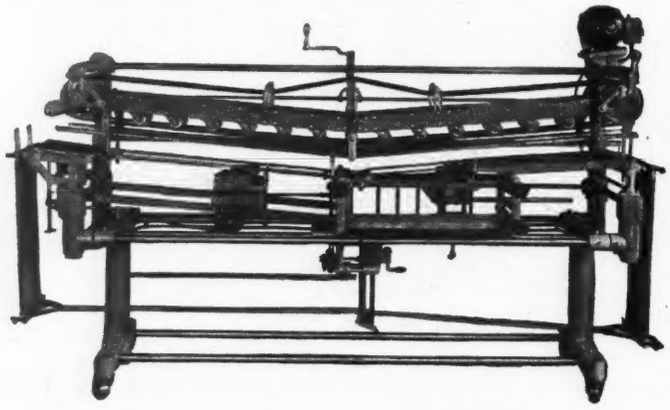
SINCE 1895 . . . ONE OF THE WORLD'S GREATEST SUPPLIERS OF ESSENTIAL OILS

16 DESBROSSES STREET, NEW YORK 13, N. Y. • 221 NORTH LASALLE STREET, CHICAGO 1, ILL.

Los Angeles: Braun Corp. • Seattle, Portland, Spokane: Van Waters and Rogers, Inc. • San Francisco: Braun-Knecht-Heimann Co. • Canada: Richardson Agencies, Ltd., Toronto

Rugged construction to assure you of years of constant operation . . .

Easy-maintenance features to minimize shutdowns for servicing . . .



NEW WAY LABELER

COMPARE THESE FEATURES:

- Precision-built throughout, with all parts machined.
- Patented aligning device keeps labels centered at all times.
- 27-inch width permits using in narrow aisles.
- Less lap-end paste required.
- Enclosed glue pot prevents contamination of gum.
- Thermostatic heat control assures positive maintenance of temperature.
- V-belt carriers run on beads of cans, preventing an accumulation of pick-up gum.
- Enclosed drives packed with grease minimize noise and wear.
- Patented extra long revolving seaming pad.
- Timing device for use with containers having bale ears and for jugs with handles.
- Can be equipped with CRCO-New Way Can Marker.
- Fully adjustable models permit range of containers from 1¾" to 6-11/16" diameter by 1¾" to 9" high.
- Can be supplied for all-around or spot labels.
- Three simple changeover adjustments: handle to set diameter, handle to set for height, handle to set glue pot —each operation indicated by vernier scale.

THE BEST OF Everything IN LABELING AND CASING EQUIPMENT

Chisholm-Ryder

COMPANY OF PENNSYLVANIA

HANOVER, PENNSYLVANIA

intensified by the need for using the "green" flour immediately, under the short supply situation.

While the patent flours are welcomed back, it is generally admitted that the past few months have taught the millers and bakers things about flour handling which many had forgotten, or had not had previous occasion to learn.

Laboratories Request Radioactive Isotopes

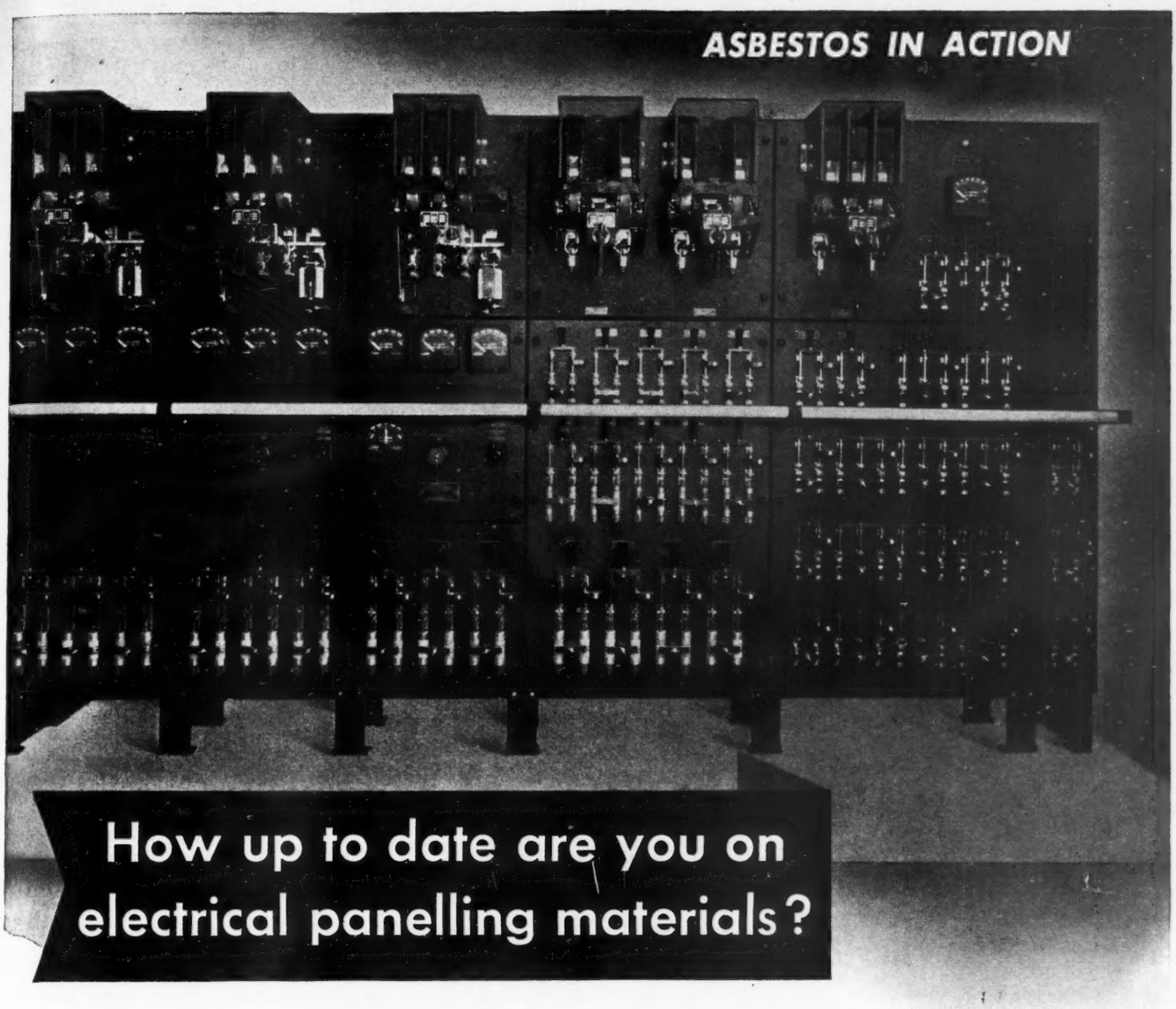
EXTENSIVE research use of radioactive materials from the Oak Ridge chain-reacting piles is evident from the early lists of applicants for the new products. One of the items in demand is Radiocarbon, (C14) which was requested by 67 investigators, who need it for work at nationally known institutions including the Bureau of Agricultural and Industrial Chemistry of the USDA, leading universities, medical schools and hospitals, large industrial corporations, and state and federal departments.

Versatility and importance of other radioactive isotopes may be judged from the number of prospective users as indicated by the first group of applications. For Radiophosphorus (P 32) there were 24 requests; for Radiosulphur (S 35), 22 requests; Radioiodine (I 131), 20; Radiocalcium (Ca 41, 45) 7; Radioiron (Fe 55,59), 6; Radiosodium (Na 24), 3. Requests are in for preliminary amounts of many other metallic and non-metallic radioactive elements.

Undue delay is not expected in filling the first requisitions filed at the time Manhattan District announced availability of the materials. Responsible investigators in accredited institutions, who want supplies of the radioisotopes, should write for detailed information from the Isotopes Branch, Research Division, Manhattan District, P. O. Box E, Oak Ridge, Tenn. A description of the materials available will be found in the June 14, 1946, issue of *Science*.

Research laboratories are charged the direct production costs of the materials in accordance with official price lists. Some of the isotopes are supplied in amounts of around one gram, only a part of which is active material. Prices are based on radioactive intensity rather than on weight.

A wholly new line of investigation in the case of biological materials was initiated at the time of the first atomic bomb explosion at Bikini. There has been considerable newspaper attention given to the



How up to date are you on electrical panelling materials?

What about the panels, switchboards, bus bar runs, and other electrical apparatus mountings in your plant? Are they proof against absorption of moisture and oil? Do they stand up under high voltage surges, vibrations, and temperature changes, retain a business-like appearance without costly maintenance?

You can answer "yes" to all those questions if your electrical apparatus is mounted on K&M Ebonized Asbestos, the *modern* panelling material. Fabricators who work it and plants that use it say Ebonized Asbestos is ideal for the purpose.

Made of tough asbestos fibres, cement and an insulating compound, K&M Ebonized is moulded into strong monolithic sheets with exceptionally high dielectric strength. It gives extra-long service, in fact it grows tougher with age. Meets the requirements of Underwriters' Laboratories, Inc., when built into an assembled unit. Write us for full technical data on this superior mounting material.

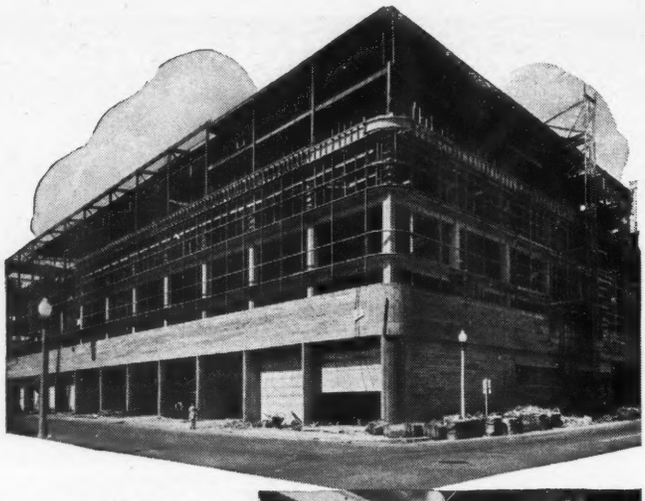
Photograph courtesy I.T.E. Circuit Breaker Co.

Nature made Asbestos...

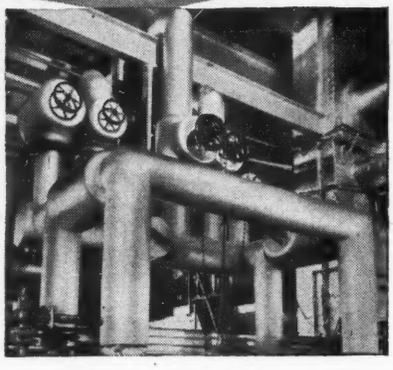
Keasbey & Mattison has been making it serve mankind since 1873

KEASBEY & MATTISON

COMPANY • AMBLER • PENNSYLVANIA



In San Francisco, the foremost insulation firm is Van Arsdale-Harris, Novoid contractor, which employs a construction staff of 75 and maintains five warehouses. Above is the exterior of the new Acme Brewery, which this firm insulated throughout with Novoid Corkboard. At right, a typical Novoid cork pipe covering job installed by Van Arsdale-Harris, in the Merchants Ice & Cold Storage Co. plant.



All over America leading Insulation Contractors install NOVOID

YOU NEEDN'T WAIT to get delivery of Novoid Cork Pipe Covering. Well-known independent insulation contractors all over the country now carry warehouse stocks of many sizes and thicknesses.

Novoid Covering is the moulded rigid insulation that efficiently reduces your cost of refrigeration. It snugly hugs pipes and fittings of every size and shape, does not sag, does not absorb moisture or odors, and is long-lasting.

For complete facts about Novoid Corkboard, Pipe Covering, and sundries specially developed to make low-temperature insulations most efficient, write to Cork Import Corporation, 330 West 42nd Street, New York City.

NOVOID INSULATION

CORKBOARD · PIPE COVERING

FUND DRIVE

Community chests of 849 cities, throughout the country, will be seeking during October, $162,000,000 of which about $150,000,000 will be for local agencies. In many areas the campaign will be combined with that of the USO, which will require $19,000,000 to carry out its morale building program for the coming year.

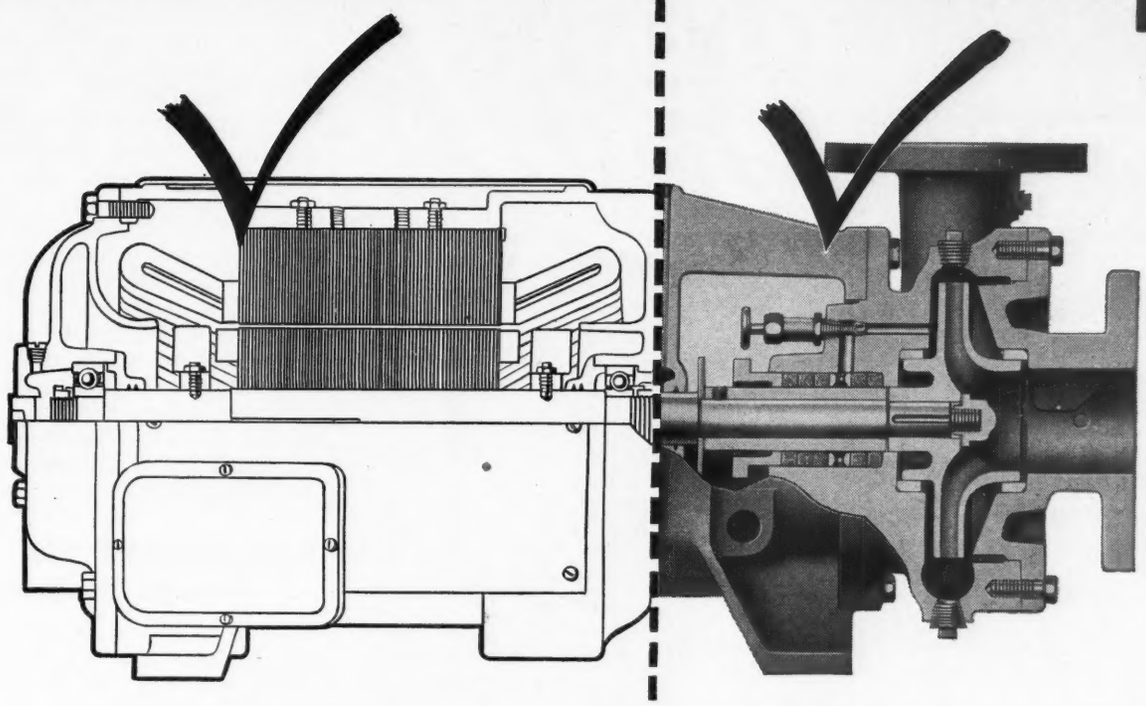
exposure of pigs and goats to the blast. It is quite probable, however, that more significant results will follow less spectacular experiments arranged by the USDA, which placed seeds, molds and plant and animal disease agents in the target area. The test materials included cereal seeds, forage crops, vegetables, flowers, cotton, hybrid corn, barley, cultures of disease organisms important in veterinary medicine, beetles, weevils, ticks and termites. These tests break new ground, but it will be some time before their results are generally available.

Trade Mark Laws Get Overhauling in Bill

FOOD manufacturers generally welcome passage of the Lanham Trade Mark bill, which was signed by President Truman, last month. The bill will benefit every businessman, in the opinion of the National Association of Manufacturers, whose news bulletin recently reported on the provisions and objectives of the act.

These were, according to the bulletin: To recodify all federal provisions relating to trade marks; to adopt trade mark protection to modern conditions of nationwide and international advertising and sale of goods; to make trade marks

Motor *and* Pump



...combined

TO GIVE UNDIVIDED RESPONSIBILITY FOR CAPACITY... EFFICIENCY... HEAD

NOT ONE maker's pump hooked up to another maker's motor —but pump AND motor, designed and built as a unit by Allis-Chalmers.

There's no buck-passing. Allis-Chalmers backs every "Electrifugal" pump all the way — tests and checks the performance of each unit, at the factory.

FOR EVERY PUMPING NEED . . . CALL ON A-C

This versatile, popular "Electrifugal" pump is only part of the complete Allis-Chalmers line of centrifugal, axial and mixed-flow pumps — single or double suction, single or multi-stage, capacities up to 170,000 gpm. Call your A-C office or dealer — or write for bulletin B6018. ALLIS-CHALMERS, MILWAUKEE.

A2073

SPLASH-PROOF, LO-MAINTENANCE MOTOR — specially built for pump service. Sturdy, long-life rotor, interchangeable stator coils.

PUMP AND MOTOR IN ONE RUGGED FRAME, and on the same shaft. Result: perfect alignment; smooth, vibrationless operation; longer bearing life.

EASY INSTALLATION AND MAINTENANCE. Just hook up and pump . . . operates in almost any position . . . all parts easily accessible for checking and service.

SIZES FROM ¾ TO 25 HP meeting a wide range of requirements as to capacity, head, and fluids to be pumped.

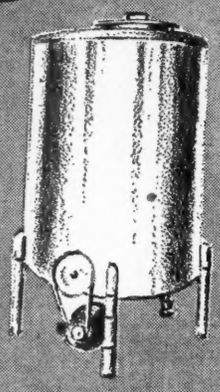
ALLIS-CHALMERS

★ One of the Big 3 in Electric Power Equipment Biggest of All in Range of Industrial Products ★

Electrifugal **PUMPS**

DO YOU HAVE A STORAGE or Processing PROBLEM to solve Economically

See the SAN-I-TANK First!

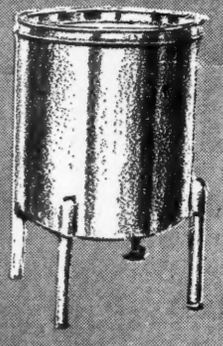


FABRICATED OF 18-8 STAINLESS STEEL—

Tanks are all welded construction finished with No. 4 polish on inside and bright finish outside.. All inside welds are ground smooth and polished. The Stainless Steel construction throughout assures you of a rust-proof, acid-resistant, easy-to-clean tank that will speed up and increase the efficiency of your processing or storage operations.

MANY MONEY-SAVING FEATURES—

San-I-Tanks have special self-draining features with specially formed bottoms sloping to the front. Engineered to give maximum performance and many years of extra use—meaning savings for you—all at no higher cost. Designed primarily to meet EVERY storage or processing need—you will find the San-I-Tank complete in every detail.

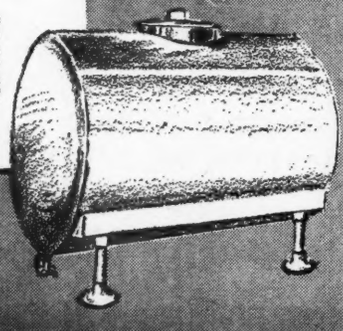


MANY SIZES IN STOCK—

San-I-Tanks are made in a wide variety of sizes, shapes and capacities. By manufacturing a so-called "standard line" we can increase our tank production and pass on the savings made to you. If you need a tank get our complete catalog first and in most cases you will find the tank that will exactly meet your requirements.

SPECIAL TANKS—
Consult Our Engineers

For your convenience we have available a complete engineering service to design and recommend the best tank for use where a standard San-I-Tank will not meet your requirements. If you have a special tank problem send us the data, and let our staff solve it for you.



WRITE for Detailed Information about these TANKS . . .

METAL-GLASS PRODUCTS CO.
BELDING, MICHIGAN Dept. F1

generally incontestable after a five-year period of continuous use in contrast to the present uncertainty; to provide registration of "secondary meaning" marks that have become distinctive of the applicant's goods; to permit "concurrent" registration of the same or similar marks to more than one user in cases where both users have adopted, in good faith, and used the mark in different parts of the country prior to the date of an application for registration by either; to permit assignment of a trade mark without simultaneous assignment of the entire business in which it is used; to simplify the registration process by coordinating administrative determinations of the Patent Office with those of the courts; to adapt our domestic law to the treaty obligations to which the U. S. is committed through membership in the International Union for the Protection of Industrial Property and ratification of the Washington Pan-American convention of 1929.

Refrigeration Study Surveys Food Industry

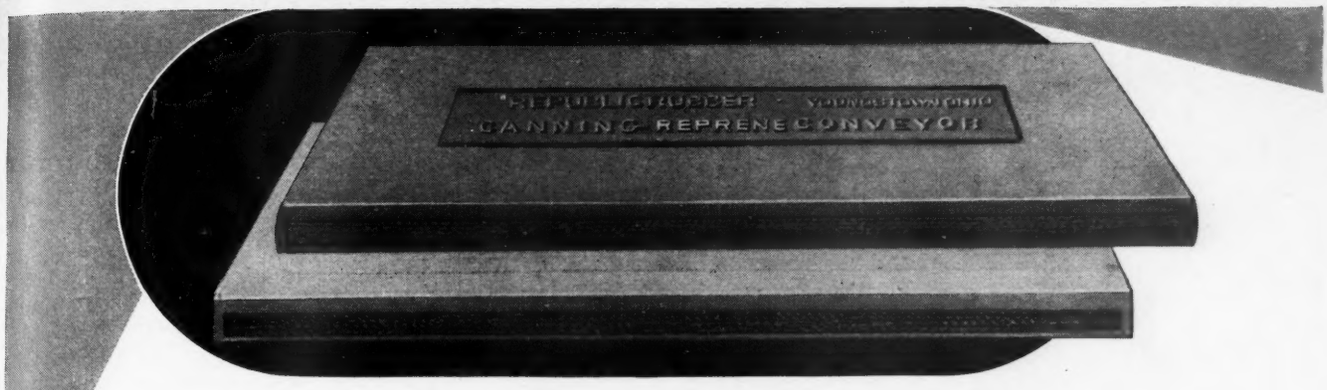
MARKET studies of important industries to determine the potential requirements for refrigeration and air conditioning equipment will be undertaken by the Air Conditioning and Refrigerating Machinery Association, representing many of the larger manufacturers of air conditioning and refrigerating equipment.

Early attention will be given by the new department to a survey of the food industry, one of the largest users of refrigerating and air conditioning equipment. The first phase of this work, which is already under way, deals with the dairy industry.

Yeast Co. Approves Liquidation Plans

STOCKHOLDERS of Northwestern Yeast Co., Chicago, recently approved the liquidation of the company and reorganization under the name of Fearn Laboratories, Inc., for the manufacture of seasoning compounds and soup bases. Fearn Laboratories was a division of the Northwestern Yeast Co., purchased last October.

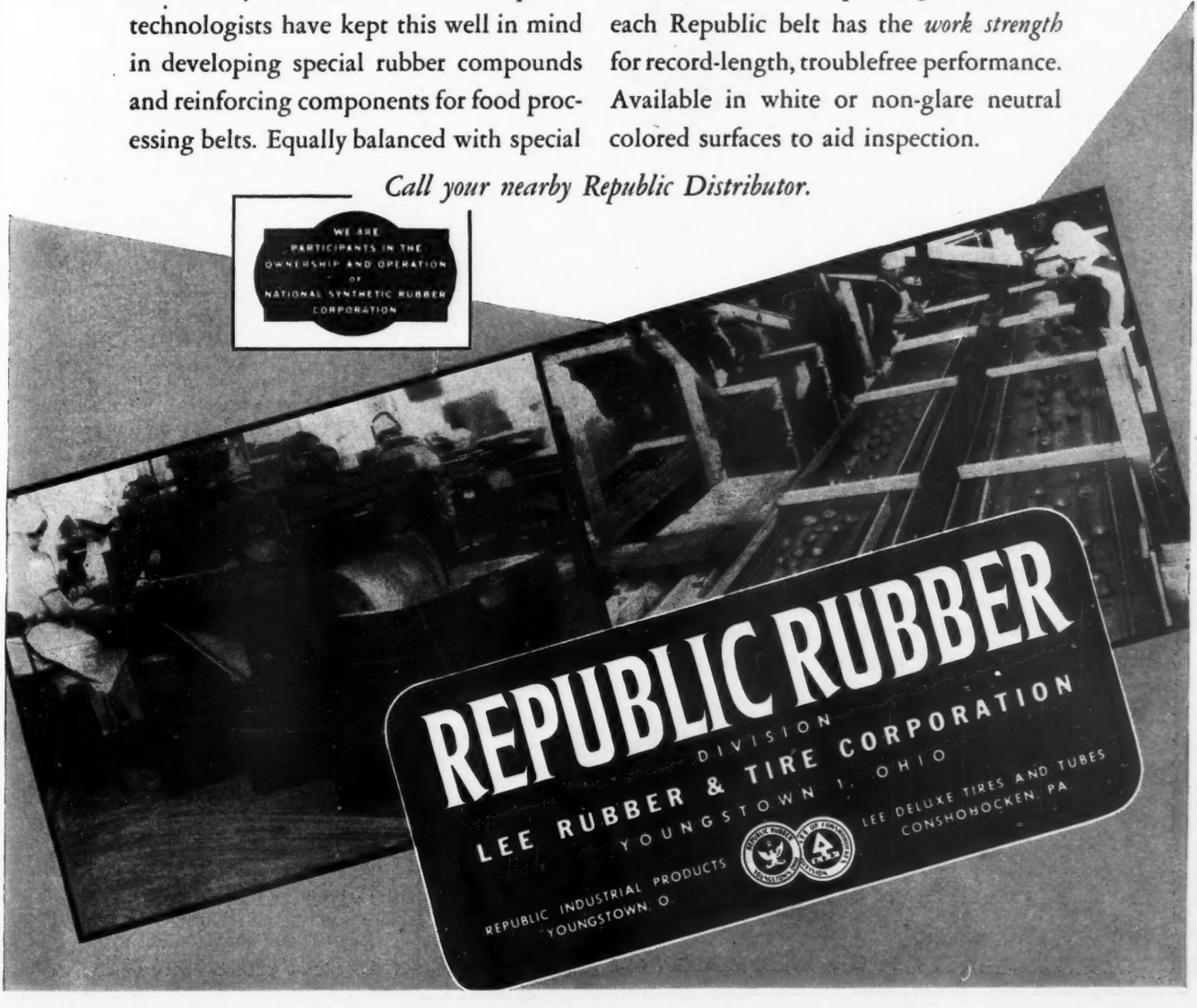
Northwestern Yeast Co. discontinued its operations because of a declining dry yeast market. The company showed a loss of $57,126 in the last quarter of 1945 and a loss of $139,662 in the first 1946 quarter.



HERE'S WHY *Republic Conveyor Belts* OPERATE SO LONG IN FOOD PROCESSING OPERATIONS

THREATS to long conveyor belt service aren't as prevalent in the food industry as in many other heavier industries. However, increased belt life is just as effective a saver of time and money here as elsewhere. Republic technologists have kept this well in mind in developing special rubber compounds and reinforcing components for food processing belts. Equally balanced with special features such as resistance to oil, heat, fruit acids, vegetable and animal fats, are the elements of mechanical ruggedness built into Republic Conveyor Belts. Designed for specific load, speed, pulley diameters and other operating conditions, each Republic belt has the *work strength* for record-length, troublefree performance. Available in white or non-glare neutral colored surfaces to aid inspection.

Call your nearby Republic Distributor.


WE ARE PARTICIPANTS IN THE OWNERSHIP AND OPERATION OF NATIONAL SYNTHETIC RUBBER CORPORATION
REPUBLIC RUBBER
DIVISION
LEE RUBBER & TIRE CORPORATION
YOUNGSTOWN 1, OHIO
REPUBLIC INDUSTRIAL PRODUCTS
YOUNGSTOWN, O.
LEE DELUXE TIRES AND TUBES
CONSHOHOCKEN, PA.

MARKET WISE EYES CHOOSE

Roanoke

A NATURAL BY THE MAP

Roanoke means a short haul to big sales . . . Astride the Norfolk & Western main line, adjacent to the Virginian, plus radiating arterial highways, *Roanoke* is a strategic distribution center... 1,000,000 cubic feet of modern cooler and freezer space, with complete financial protection...For quick access to your market, cold-storage at *Roanoke*. Icing facilities available. Write for illustrated folder.

Roanoke Ice & Cold Storage

ROANOKE, VIRGINIA

PROCESSING

Chicago U. Undertakes Food Research Program

BASIC research on use of various anti-oxidants in connection with the keeping quality of fats, staphylococcus poisoning and heat-resistant organisms found in canned products is now under way at the University of Chicago under the auspices of the recently established Food Research Institute. Dr. Gail M. Dack, a bacteriologist and authority on food poisoning, is director of the Institute.

It has been established by the University of Chicago to fill the need of the food companies and to have a place where basic research on foods can be carried out cooperatively. Coordination of research efforts, in industry and in universities, can be realized in the work of such an Institute. The work of the Institute supplements rather than competes with research carried on in industrial, scientific and medical laboratories.

The types of food problems under consideration for study are:

Food spoilage; causes of undesirable taste, color, or odor; factors affecting quality and preservation of raw foods; food poisoning; effects of increase or decrease of storage periods; effects of soil on chemical content of plants; food problems of the physician and surgeon; food problems of the pharmacologist; problems of nutrition.

In addition to the director, the Institute is under the guidance of an industry advisory committee and a University advisory committee.

On the Industry committee are:

Dr. Gail M. Dack, chairman of the committee; Dr. Eugene C. Auchter, president, Pineapple Research Institute; Dr. Franklin C. Bing, director, American Institute of Baking; Dr. E. J. Cameron, director, research laboratory, National Canners Assn.; Dr. J. E. Hunter, director of research, Allied Mills, Inc.; Dr. R. C. Newton, vice-president, Swift & Company; Dr. Lloyd Riggs, director of research, Kraft Foods Company; Dr. Herbert J. Smith, director of research, Ralston-Purina Co.; Dr. Robert R. Williams, research chemist formerly Chemical Director, Bell Telephone Laboratories.

The Institute will serve as a post-graduate training school for young biological research workers, from which the food companies can obtain personnel for their laboratories. The present staff is supplemented on particular projects by specialists working in various other departments of the University.

let the chips fall

GOLDEN-BROWNED by Gas

Gas-fired cooking equipment at Dickey's Potato Chip Co., New Orleans, Louisiana.

Crisp and golden-brown they must be—golden-brown and crisp they will be if they're cooked with GAS. Regardless of the type of cooking-oil, the exact temperature for perfect browning can be obtained with GAS; heat fluctuations, which cause oil absorption by potato chips, are prevented by automatically-controlled GAS flames.

MORE AND MORE...

THE TREND IS TO GAS

FOR ALL HEAT PROCESSING OF FOODS

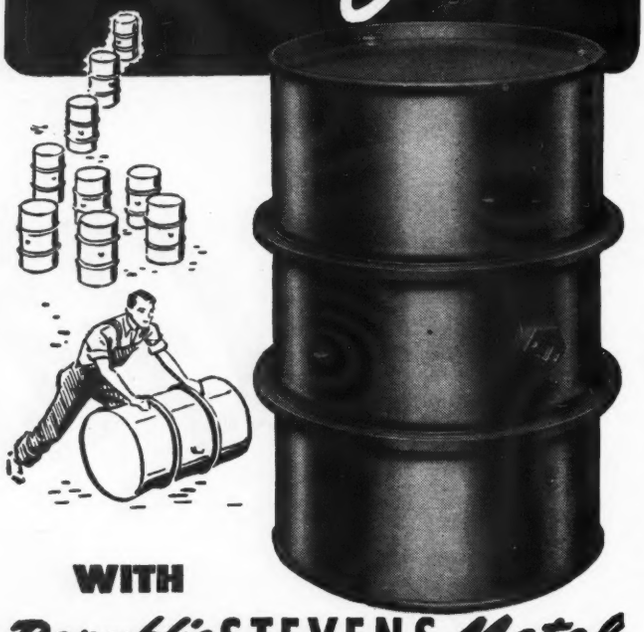
Then, too, GAS is the ideal fuel for maintaining the high standards of cleanliness and rigid sanitary requirements of food-processing industries; comfortable and clean working conditions also improve employee-management relationship.

Compared with other available heat sources GAS is the ideal fuel for food processing. GAS combines all desirable features such as flexibility, economy, simplicity and accuracy of control, dependability of supply. That's why GAS is the best heating medium for quality food products and profitable food specialties. Your local Gas Company can supply you with up-to-date information on modern Gas equipment.

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE NEW YORK 17, N. Y.

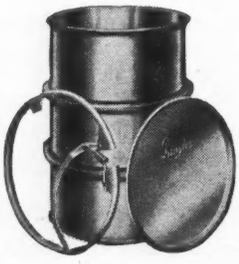
Slash CONTAINER MAINTENANCE Costs



WITH

Republic STEVENS Metal BARRELS AND DRUMS of ENDURO Stainless Steel

Down come container maintenance costs when you use barrels and drums of Enduro—because this lustrous metal resists corrosion, resists hard use and abuse, never needs repainting or refinishing and lasts indefinitely. Enduro is safe to use, too, because it neither affects nor is affected by most chemical and food products.



You'll find just the style and size you need in the Republic STEVENS Line. Write us for further information.

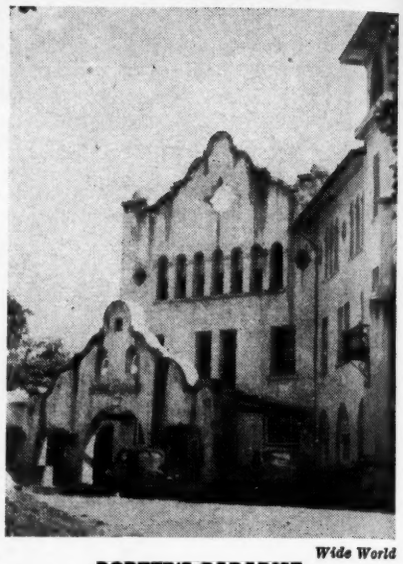
★ ★ ★

Easy to open—easy to close—that's the patented Ringlox closure shown at the left. It insures a positive and permanent seal—and you may have it on STEVENS Products.

NILES STEEL PRODUCTS DIVISION
REPUBLIC STEEL CORPORATION
NILES, OHIO

REPUBLIC STEEL — SERVES THE WORLD

Republic STEVENS
METAL BARRELS AND DRUMS



Wide World

PORKER'S PARADISE

The social standing of the Colfax Hotel, a former $1,000,000 health resort at Colfax, Ia., has been altered somewhat. The guests are now pigs, 450 of them, placed there by the Purebred Livestock Exchange, with the hope of selling Iowa farmers on the value of raising only purebreds. The hogs have 160 acres to roam while enjoying full resort comforts, especially the selected diet.

Since successful results from the Institute can only be gained by close association of industrial research workers with those of the university, the Food Research Institute is to be housed in a separate laboratory building on the campus. Plans have been made to construct such a building adjacent to related biological research facilities and to the proposed $500,000 Research Laboratory of the American Meat Institute Foundation, with which the University has been collaborating since 1925. The building will house research laboratories for the staff of the Institute and facilities for food companies who desire to equip, maintain and staff laboratories for basic research within the Institute; supplementing their own testing, control and development laboratories.

Endowment funds for the construction and maintenance of the proposed laboratory, amounting to an estimate of $1,250,000, will be provided by business corporations and organizations interested in public health and advancement of biological knowledge as well as by individuals.

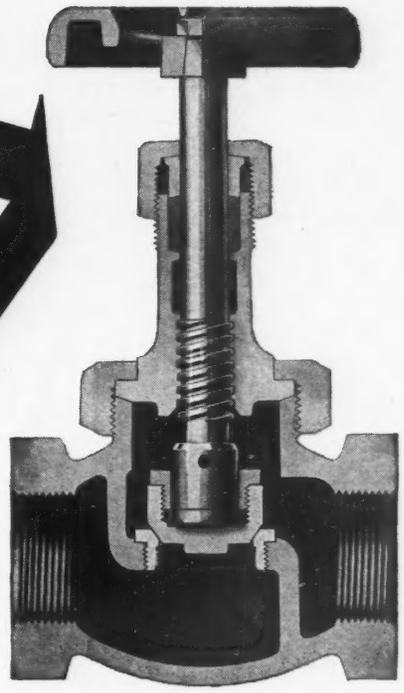
The University's basic policies prohibit the school from profiting financially from research by means of patents, royalties or licensing agreements. Members of the staff will not be permitted to receive direct or indirect financial returns

Every feature you want in a

BRONZE GLOBE VALVE

with Full-way Disc...

is in this KENNEDY DESIGN

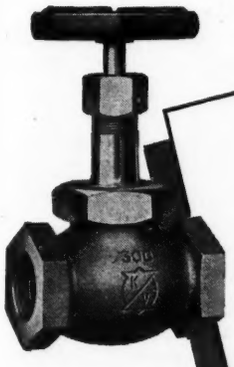


You can use this Kennedy design on high temperature steam, water, oil or gas lines with full confidence that it will give complete satisfaction.

Notice the sturdy construction of every part . . . the renewable disc and seat ring . . . the full-way disc area . . . the ample pipe-end clearances and packing space . . . the true union joint made by the body-bonnet connection . . . and the many other details that provide *what you want* in a full-way disc globe or angle valve.

These valves are furnished in a full range of sizes for 200-lb. and 300-lb. steam pressure at 550° F. and for cold water, oil or gas pressures up to 600-lb. Complete description, specifications, dimensions and prices are given in the 240-page Kennedy Catalog which will be sent on request.

Buy From Our Distributor



YOU WANT THESE VALVE FEATURES
. . . you'll find them in this KENNEDY design

1. **Generous Strength . . .** Body and bonnet are of high-grade dense metal with ample thickness and rounded fillets. Stem has large diameter and extra large number of contact threads.
2. **Easy Operation . . .** Stem and stem contact surfaces are accurately threaded. Deep stuffing boxes permit tightness without undue pressure on packing. Large handwheel gives firm, comfortable grip.
3. **Lasting Tightness . . .** Discs and seats seat accurately, and their sturdy design resists distortion and has special provisions for take-up of wear.
4. **Long Life . . .** Many Kennedy valves have been in daily use a quarter century and more.
5. **Convenient Repacking . . .** Glands and packing are easily accessible.
6. **Economical Maintenance . . .** Long wear built into all parts, and adjustments or other attention are seldom required.

THE KENNEDY VALVE MFG. CO.
Elmira, New York

KV-114

KENNEDY *valves - pipe fittings - fire hydrants*

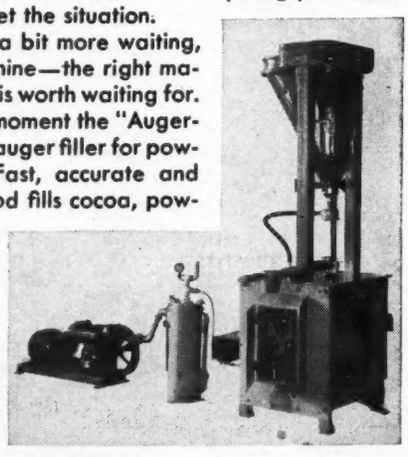
This "Joe" has been warming the chair since eight o'clock —*it is now after nine*—but *isn't* she worth waiting for?

You folks out there have been doing your share of waiting too. During the war years priorities regulated 'most everything you wanted to buy, including S & S filling, packaging and wrapping machines.

Frankly, the sudden end of hostilities caught us with no machines in stock . . . with no parts on hand. Pent-up demand has released a flood of orders. The material situation is improving, though castings are still hard to get; but it takes time to manufacture machines. Our production facilities have been increased and we have taken on more manpower. We know our customers will understand the reasons for unfilled orders . . . everything possible is being done to meet the situation.

It will take just a bit more waiting, but an S & S machine—the right machine for the job—is worth waiting for.

Consider for a moment the "Auger-Vac," the vacuum-auger filler for powdered products. Fast, accurate and dustless, this method fills cocoa, powdered milk, flour, dehydrated foods and such other powders that require some packing to fill a container. We will gladly supply full information.



STOKES & SMITH Co

4911 Summerdale Ave., Philadelphia 24, U. S. A.

FILLING • PACKAGING • WRAPPING MACHINES

Speeds to suit your needs—15-30-60-120 per minute

Better machines for better packages

from patents based on work performed during the period of their employment by the University or to make arangements for such returns to take effect after the employment has terminated. The University will cooperate with industrial organizations by conducting fundamental research projects financed by grants, and will make research reports to the grantors, but retains the right to publication of the results.

New Process Increases Vegetable Oil Yield

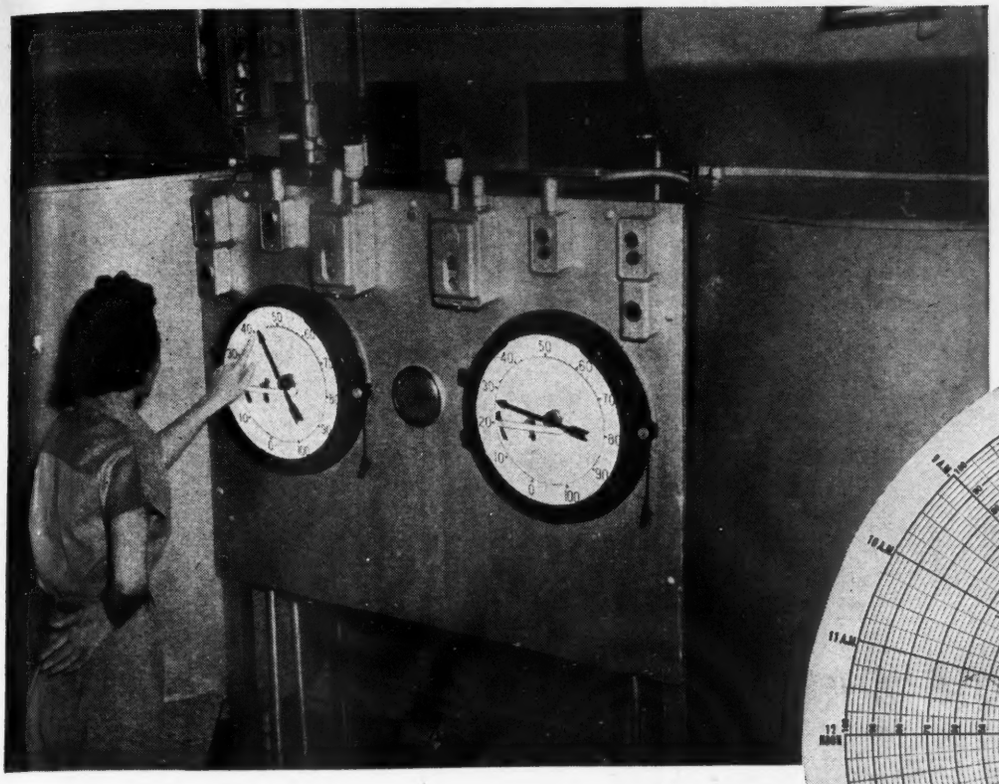
A REVOLUTIONARY new solvent extraction system which can increase the annual oil yield from cottonseed, linseed, castor and most oil-bearing seeds, nuts and beans by 20,000 tons, is reported to have been developed by the Sherwin-Williams research staff at the company's Cleveland Linseed Oil Mill.

According to the company, the new process can extract 98½ percent of the available oil from vegetable matter used in the production of salad oils, cooking oils, soaps, linoleum, paints and other products. This yield exceeds other known recoveries to the extent it is said, that in normal years the increase in vegetable oil will reach 40,000 tons.

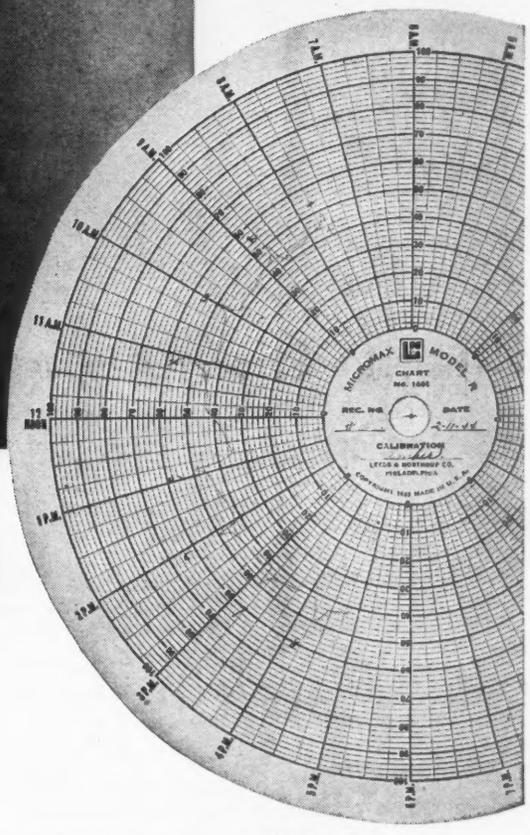
For the first time, a universal extraction plant is available. One plant can be used interchangeably for the extraction of oil from castor beans, cottonseed, cocoa beans, copra, corn germ, cashew shell nuts, babassu, hempseed, linseed, lumbang, oiticica, palm nuts, palm kernels, peanuts, perilla, rape seed, safflower, sunflower, soybeans, sesame, tung nuts, and wheat germ. In addition to its flexibility, the new system requires only two-thirds the plant space needed by other processes, resulting in a substantial saving in building construction, installation and machinery costs.

Until this development, solvent extraction was never before commercially successful in a one-step operation, except in the case of soya. Seeds and beans were first processed by hydraulic or expeller pressure methods, and then treated batchwise with a solvent to win much of the remaining available oil. These processes required from one and one-half hours to three hours to convert the oil in the raw seed to the finished product. The new method cuts the time to one hour.

Besides giving greater yield, the new system actually increases the percentage of top grade oil obtained from castor beans. In tests at their pilot plant, Sherwin-Williams chem-



Two processing kettles for Vick Chemical Co.'s Vaporub, and the signal-operating Micromax Recorder for each, in the Philadelphia plant. Note the easy visibility of these round-chart instruments. One of the records, below, shows the regularity with which heating schedules are followed, and the strict holding of critical peak temperature.



CRITICAL TEMPERATURES CLOSELY RECORDED BY *MICROMAX*

The uniform quality of Vick's Vaporub can be influenced by a variation of as little as 2°C in peak mixing temperatures. To help hold these temperatures closely, Micromax Recorders were chosen . . . not only for their dependability, but for their clear, wide charts, easily readable from wherever the operator is standing. Adding assurance, signal lights warn when temperature is getting out of hand and quick action must be taken.

These balance instruments are so micro-sensitive that, informed by sturdy thermocouples, they respond instantly to the tiniest temperature changes . . . which are charted accurately and continuously in a permanent record of heating.

Micromax instruments are fully automatic, and require only minimum attention. They come in several models and ranges, to measure a number of conditions, including not only temperature but pH, humidity, the concentration of various gases, etc. In addition to indicating, recording and signal-operating, as at Vick's, they can give efficient and reliable control.

Just outline your recording problem, and we'll send descriptive literature, or have an L&N engineer make a specific recommendation, as you prefer.

LEEDS & NORTHRUP COMPANY, 4912 STENTON AVE., PHILA., PA.

LEEDS & NORTHRUP

MEASURING INSTRUMENTS • TELEMETERS • AUTOMATIC CONTROLS • HEAT-TREATING FURNACES

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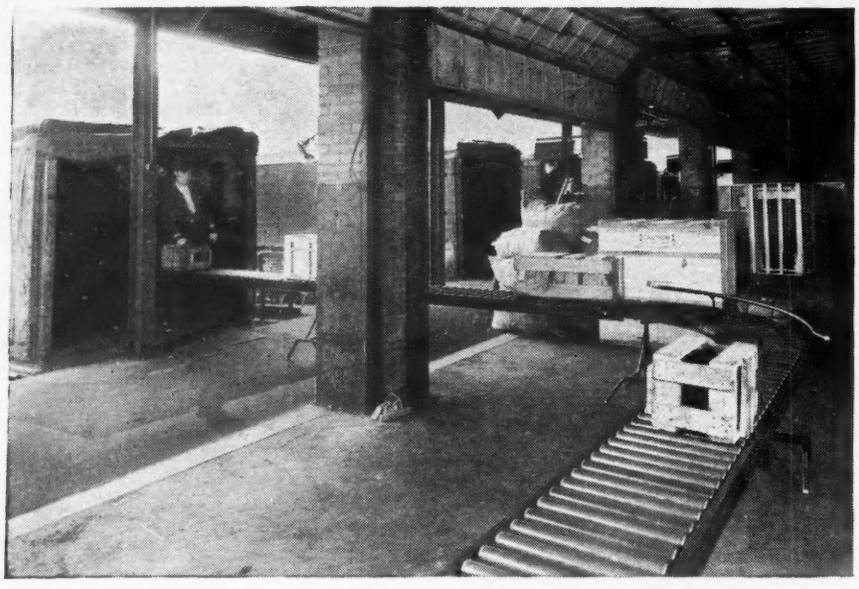


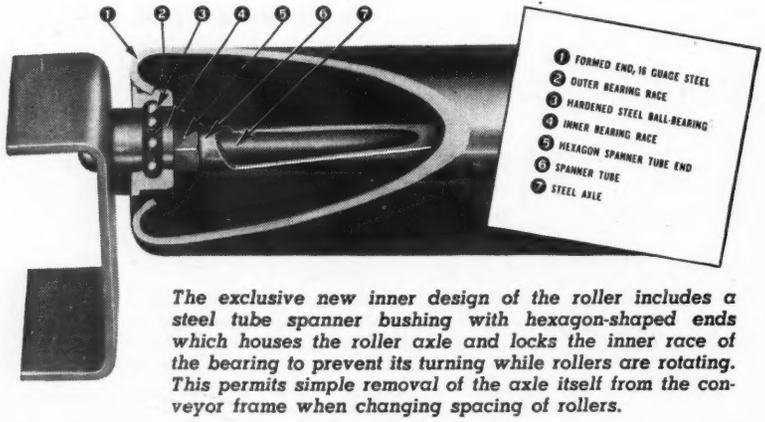
New Rapid-Roller Conveyors

Handles Boxes - Crates - Cans Kegs - Drums - Lumber

Rapid-Roller Conveyor can easily adapt itself to your material handling problem, do the job quickly, and pay for itself by eliminating old-fashioned hand-moving methods.

Rapid-Roller will move anything with one firm, free-running surface such as cans with chimes, kegs, drums, light steel bars, angles or lumber.

Rapid-Roller's unique frame and roller construction combines sturdiness with minimum weight. The frame is made of 12-gauge steel . . . cross-braced and arc-welded. Will carry 800 to 1,000 lbs., recommended maximum weight distributed over a 10' section.



The exclusive new inner design of the roller includes a steel tube spanner bushing with hexagon-shaped ends which houses the roller axle and locks the inner race of the bearing to prevent its turning while rollers are rotating. This permits simple removal of the axle itself from the conveyor frame when changing spacing of rollers.

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OFFICES IN PRINCIPAL CITIES

Manufacturers of
STEEL FORGED CASTERS · TRUCKS · CONVEYORS · POWER BOOSTERS

The Rapids-Standard Co., Inc.

Sales Division—361 Peoples National Bank Bldg., Grand Rapids 2, Michigan

ists found that 98½ percent of the oil won was top grade quality. With other methods, where the castor bean is subjected to high temperature over a long period of time, only 75 percent was top grade.

The new system makes the residual meal marketable for the first time for use in the manufacture of glue, resins, emulsions, cloth, paper and other similar products. The proteins are not degraded, as they are when subjected to pressure.

Paper Companies Plan Yeast-Growing Plant

PLANS to build a yeast-growing plant in Wisconsin to utilize waste sulphite liquor from paper mills are underway by 11 paper companies.

One of the approaches to the solution of the problem has been an extensive research study at the Institute of Paper Chemistry at Appleton, Wis., with J. M. Holderby as coordinator. Another has been the study of yeast-growing plants in Germany, where paper-mill wastes are used.

The process to be used makes use of the wood sugar in the sulphite waste and is considered to be considerably improved over European processes. Utilization of the lignin remaining in the waste solution is still under study. Yeasts produced by the process are competitive in price with other animal protein feeds and are expected to be producible in edible quality grade for human food use also.

Ohio State Expands Its Poultry Course

DURING the past year about 1,000 turkeys, 2,000 chickens and other poultry were processed as a part of the poultry processing course offered at Ohio State University. Up until now the course has been given only in the fall quarter, but if enrollment is sufficient to justify offering the course twice a year, it will also be offered during the spring quarter. Sixty percent of the course in the fall quarter deals with the processing of poultry meat, but it is planned that the course to be given in the spring, will be devoted primarily to egg processing, as eggs are more plentiful then.

Additional equipment has been added to the small processing plant each year. Facilities now include equipment for killing, dressing, eviscerating, packaging, freezing and storing poultry. The processing

ALL DRESSED UP
AND PLENTY OF PLACES TO GO...

There is good reason why your catsup goes home in more shopping bags when you use Foster-Forbes bottles. Clear, sparkling attractiveness—quality first impression—a perfect setting for your label—all contribute to make your catsup a quick volume seller in Foster-Forbes bottles.

FOSTER-FORBES GLASS COMPANY

MARION, INDIANA, U. S. A.

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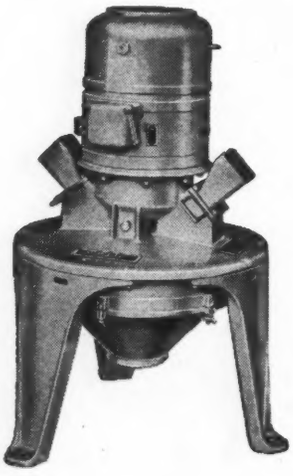
PROTECT *Your Products*

"ENTOLETER" SYSTEM GIVES CONTINUOUS BUG CONTROL *plus!*

Operating records prove that "ENTOLETER" Continuous Control destroys all forms of insect life. In addition to this service, mills and food plants are reaping other benefits from the "ENTOLETER" system. Here are three positive advantages.



1 KILLS ALL INSECT LIFE

Now, more than ever, your plant and products need the "ENTOLETER" system of continuous insect control. It helps you to avoid waste of scarce food materials . . . to protect 80% flour . . . to insure the high standards of your products.

2 ESSENTIAL IN FRAGMENT CONTROL

The "ENTOLETER" system is being used successfully to reduce fragment count. Send for copy of our latest bulletin describing methods of application.

3 AIDS PRODUCT UNIFORMITY

Food plants and flour mills have found that the "ENTOLETER" system offers an excellent means of blending flours, mixing ingredients in compounds and improving vitamin distribution. This, alone, more than justifies its cost.

For full information on "ENTOLETER" Continuous Insect Control System, write to ENTOLETER DIVISION, The Safety Car Heating and Lighting Co., Inc., P. O. Box 904, New Haven 4, Connecticut.

ENTOLETER
INFESTATION DESTROYER
REG. U. S. PAT. OFF.

STANDARDIZED PACKAGING

E. A. Throckmorton, president, Container Testing Laboratories, has been elected chairman of the Packaging Institute's standing committee on trade standards and practices, responsible for the packaging industry's new standardization program.

laboratory also includes a temperature and humidity-controlled egg grading room, a breaking room, and facilities for packing both shell and frozen eggs.

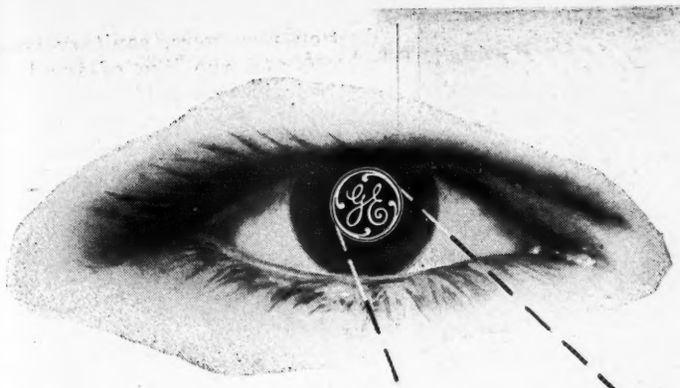
The poultry department has future plans for adding facilities for canning poultry, for pasteurizing and drying eggs and for reclaiming poultry and egg inedible byproducts such as shells, incubator residue, feathers and eviscerating waste materials, and to establish an experimental poultry products testing kitchen.

The preparation of eviscerated and cut up poultry and the packaging of these products are emphasized in the course as well as are inspection and grading of live, dressed and eviscerated birds.

Baking Institute Adds New Laboratory Service

THE American Institute of Baking, Chicago, is offering an additional laboratory service to members of the industry, through which microanalytical detection of filth in bakery products and ingredients may be obtained. The service will be a safeguard to the purity of the bakers products and the ingredients purchased. It is under the direction of Dr. William Bradley, head of the Institute's laboratories.

In addition a special course in bakery sanitation will be conducted by Dr. Edward L. Holmes, of the Institute sanitation department, November 4 to 8 at the Hotel Sherman, Chicago. Industry, government and public health authorities will participate in informing pro-



What to look for in refrigeration . .

Keep your eye peeled for that familiar G-E symbol. On a condensing unit—the heart of all refrigerating equipment—it means modern, compact design . . . steady, economical operation . . . long life.

And *these* days it means a lot more, too. Your G-E distributor or contractor will help you keep your present unit running until there are enough G-E Condensing Units to go around. He'll help you analyze your refrigerating needs in the light of your future plans and prospects.

When you do get the G-E Condensing Unit you're waiting for, your G-E distributor will always be there, ready and willing to give you the kind of service that has made G-E a name to depend on in refrigeration. *General Electric Company, Air Conditioning Dept., Section 6899, Bloomfield, New Jersey.*

GENERAL ELECTRIC

Industrial Refrigeration

Cut Materials-Handling Costs . . .

- Unloading and loading freight cars, ships and trucks
- Routing material and packaged products in processing plants
- Warehouse receiving, storage and delivery

One man can unload a truck quicker, and with less fatigue, when he uses a lightweight portable gravity conveyor.

● The LAMSON LIGHTWEIGHT PORTABLE GRAVITY CONVEYOR can be set up quickly to expedite the unloading or loading of freight, and deliver freight to or from any section of warehouse or dock storage. Strong and stable, adaptable to inclines and curves. In warehouse receiving and delivery it affords more road-time for fleet and delivery trucks.

Packaged merchandise is carried from basement storage and delivered to shipping department as required, over Lamson Roller Gravity and Belt Conveyors.

● LAMSON ROLLER CONVEYORS are saving time and cutting costs in many food plants throughout the country. Adaptable to handling all types and kinds of containers. Installations in new or old buildings soon pay for themselves and increase plant earnings.

Tiering with a Lamson Utility Conveyor. Adjustable to various angles. ←

LAMSON UTILITY CONVEYORS can be used anywhere for loading, unloading and tiering. Serves as an auxiliary to portable or built-in plant conveyor systems.

Lamson, an organization of materials-handling engineers, invites consultation on special handling problems. Field engineers are available without cost or obligation to your company.

LAMSON CORPORATION
SYRACUSE 1, N. Y.

Write for
DESCRIPTIVE CONVEYOR FOLDERS

LAMSON CORPORATION,
625 Lamson St., Syracuse 1, N. Y.

Gentlemen: Please mail folder or folders on:
( ) Lightweight Portable Gravity Conveyors
( ) Roller Gravity Conveyors ( ) Utility Conveyors

Name.....Title.....

Company.....

Street.....

City and Zone.....State.....

duction managers, sanitary supervisors, and the like of the latest methods in this field.

Among the speakers will be George W. Larrick, assistant commissioner of Food and Drugs, Washington, D. C. A representative of the U. S. Public Health Service will give the latest information on rodent proofing of buildings. University representatives from departments of entomology will collaborate with industrial entomologists to present the latest information on insect and pest control.

USDA Regulations

REVISION of the rules and regulations governing sampling, grading, grade labeling and supervision of packaging of butter, cheese, eggs, poultry and dressed domestic rabbits, issued July 19, contains few features of importance to the food processor. The purpose of the revision is: (1) to change the names of the various organizations within the Department of Agriculture so that the regulations will be brought into uniformity with the many department reorganizations, (2) to define terms that have been in use for sometime without such clarification, and (3) to raise the fees for the inspection service in order to make it self-supporting as it is supposed to be.

Food Standards

ISSUANCE of food standards, held in abeyance during the war, has been resumed by the Department of Agriculture. Full text for any of the following may be had by writing to the Standardization and Inspection Division, Production and Marketing Administration, USDA, Washington, D. C.

U. S. Standards for Fresh Freestone Peaches for Freezing or Pulping, effective April 17, 1946. U. S. Standards for Fresh Freestone Peaches for Canning, effective April 17, 1946. Supplement to Tentative U. S. Standards for Grades of Frozen Peaches, effective June 1, 1946. Tentative U. S. Standards for Grades of Canned Dried Prunes, effective March 1, 1946. Tentative U. S. Standards for Grades of Frozen Sweet Cherries, effective June 1, 1946. Tentative U. S. Standards for Grades of Green Olives, effective June 1, 1946. Tentative U. S. Standards for Grades of Canned Blueberries or Canned Huckleberries, effective August 1, 1946. U. S. Standards for Grades of Canned Tomatoes, effective August 1, 1946. Tentative U. S. Standards for Grades of Frozen Blueberries or Frozen Huckleberries, effective August 1, 1946.

WHY IS IT some packages stand out on store shelves and others do not?

Package design and fine reproduction are the obvious answers. But there are many ways a package can be given eye-appeal. For example:

- **Some color combinations demand more attention than others.**
- **Typography can be rugged and masculine, or it can be dainty and feminine.**
- **Art style can be lavish and ornate, or it can be plain and simple.**

That's where Continental's experience and skill come in. Our master craftsmen know how to reproduce your design by modern lithography exactly as you want it.

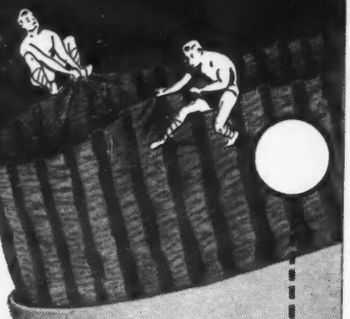
Remember, whether it's reproduction or actual creation of the design, you can be sure of the finest quality, and best in service, when you come to Continental with your packaging problem.

CONTINENTAL CAN COMPANY

100 East 42nd Street, New York 17, N. Y.

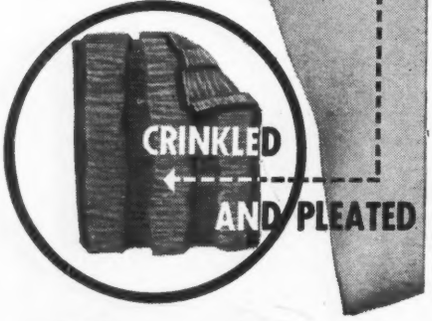
CHASE LINERS

** Stop Liner Breakage!*
** Stretch in All Directions!*



Chase Liners are better, more resilient, more flexible! Here's why: they're crinkled for vertical elasticity *and* pleated for horizontal elasticity! Result: no more broken liners nor costly damage to contents due to liner failure or breakage.

Check on Chase Liners today. They're the crinkled and pleated liners that assure savings . . . that actually cost no more!



CHASE BAG CO.

GENERAL SALES OFFICES
309 WEST JACKSON BLVD., CHICAGO 6, ILL.

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ST. LOUIS • NEW YORK • CLEVELAND • MILWAUKEE • PITTSBURGH
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CITY • PORTLAND, ORE. • REIDSVILLE, N. C. • HARLINGEN, TEXAS
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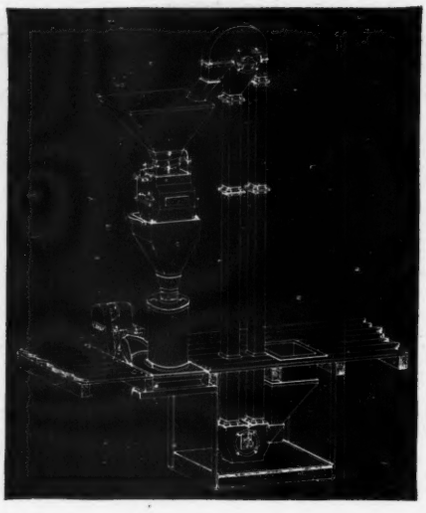


HOW EFFICIENT IS YOUR *Weighing Operation?*

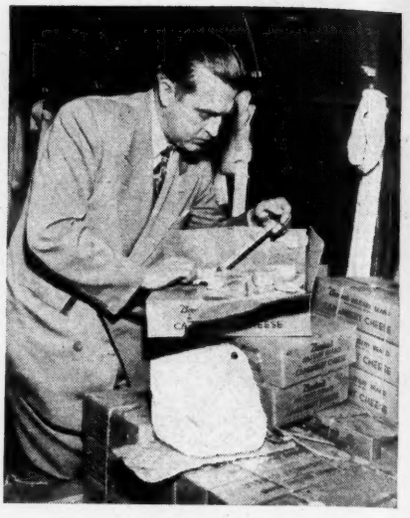
THE diagram above shows a compact installation of an EDTBAUER-DUPLEX Net Weigher, discharging accurate amounts of material into a container. Material is being packed down in the container by a VIBROX Packer. Although gravity flow of materials from hoppers on floor above is preferred, where this arrangement is not possible an elevator can be used as shown. The efficient, economical and *accurate* weighing of dry, granular, powdered or flaked materials in weights up to 50 pounds is a highly developed specialty of ours. Gump engineers will gladly suggest the best equipment and installation, with complete cost estimates. May we send you complete information? Write today!

MAKERS OF: *Equipment for Grinding, Sifting, Mixing, Feeding and Weighing of Dry Food Products.*

B. F. Gump Co.

Established 1872

454 South Clinton Street Chicago 7, Ill.



CHEESE AIRED

The first air shipment of Camembert cheese to arrive on the West Coast from New York, is being tested here by P. L. Humphrey, western manager of the Borden Cheese Co. Air shipments insure delivery on the Coast within 24 hours after the cheese leaves the factory, thus avoiding the danger of its becoming overripe in shipping delays.

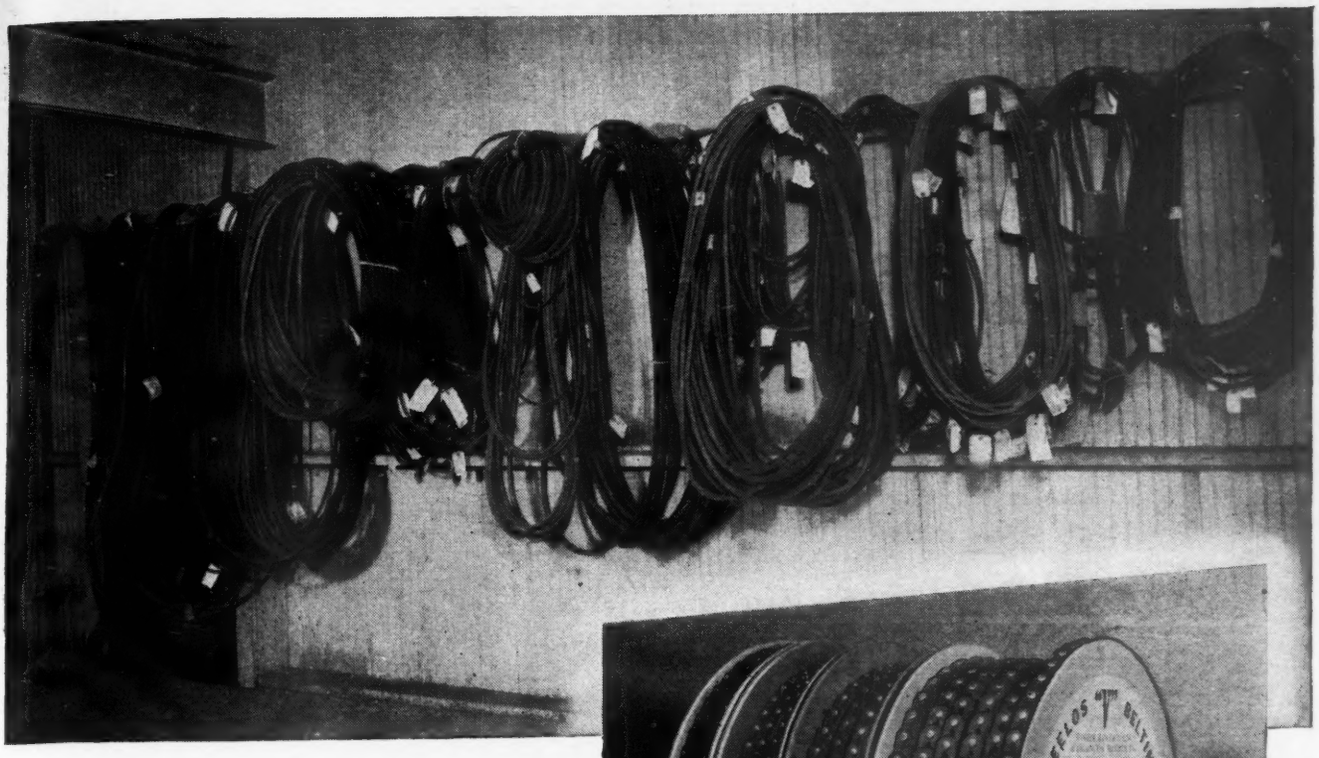
Bowman Dairy Renews Educational Program

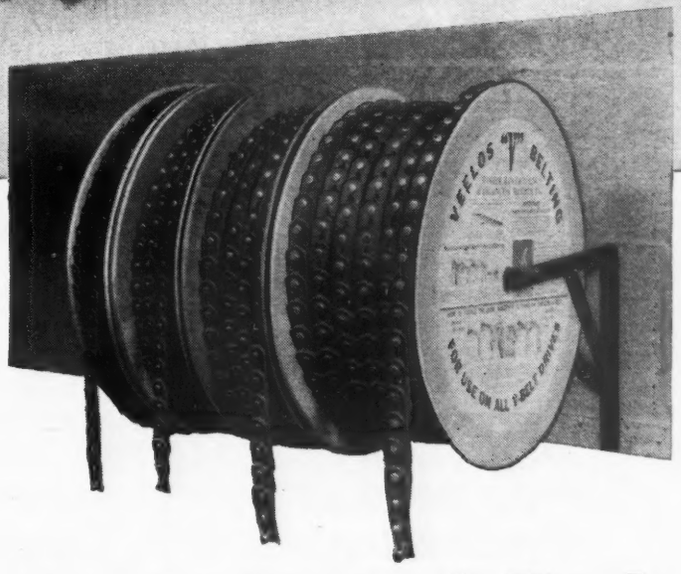
PLANS are being made for the fall term of classes sponsored by Bowman Dairy Co., Chicago, for its employees. The employee educational program was initiated September, 1944, (see FOOD INDUSTRIES, August 1945, pg. 90) in cooperation with the University of Illinois. The first course given by the University was dairy technology. It proved so popular that it was given again with additional courses relating to the dairy field.

Thirteen classes will be conducted this fall, covering speech, merchandising, processing dairy products, supervisory training and salesmanship. Some of these will be given on several different days and both in advanced and beginning classes. Since its beginning in September, 1944, 511 employees have taken 832 courses. Over 200 of the students have taken more than one course, indicating the continued interest in the program. One employee has taken seven subjects since September, 1944.

Table Shows Change In Food Production

PRODUCTION statistics, recently appearing in *Business Week*, included a table showing the percentage of change in food output in the first half of 1946 compared with the monthly output in 1941, the previous banner year. These are based





316 sizes OF ENDLESS V-BELTS CAN BE Replaced with only 4 sizes of Veelos

FROM only four widths of Veelos—the link V-belt—you can make up 316 standard sizes of industrial and fractional endless V-belts. There's no need to stock spare sets of endless belts for each drive.

Large, costly inventories are eliminated... no deterioration of spare belts... no obsolescence.

Veelos on reels saves stockroom space... reduces inventory records... *is easy to locate and easy to install.*

Made in all standard sizes... fits all standard V-belt grooves ... available in standard 100-foot reels.

VEELOS
THE LINK
V-BELT

Adjustable to any Length
Adaptable to any Drive

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Tested • Proved • Adopted by American Industry

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Easy Sailing
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THE BETTER SPICE FLAVORS
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Send for the new . . . detailed . . . informative SPICEOLATE BROCHURE
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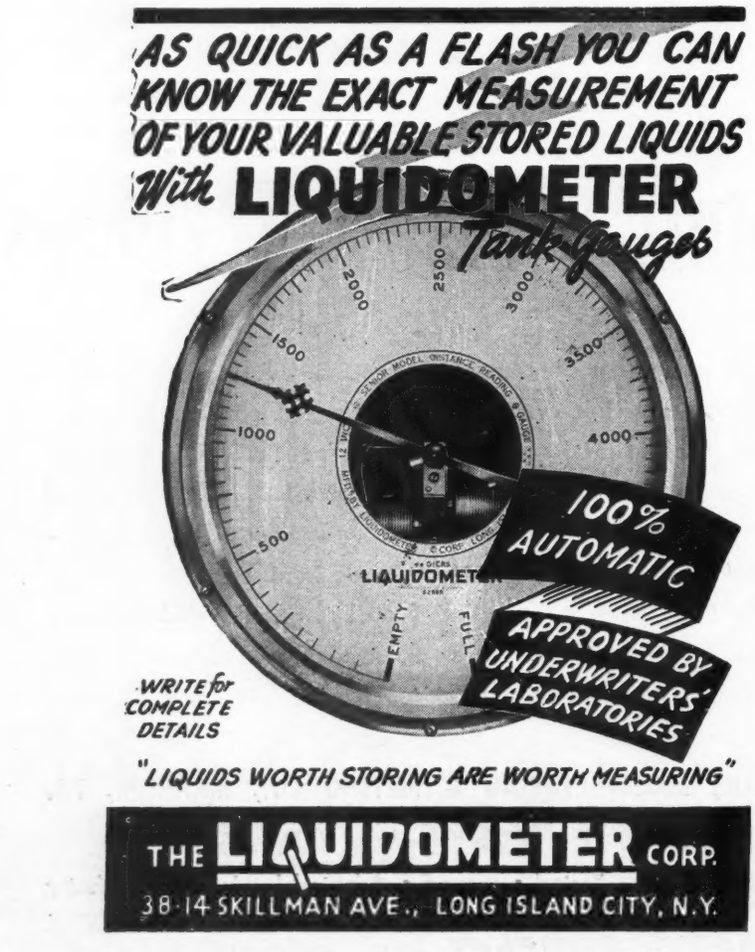
AS QUICK AS A FLASH YOU CAN KNOW THE EXACT MEASUREMENT OF YOUR VALUABLE STORED LIQUIDS
With LIQUIDOMETER Tank Gauges
100% AUTOMATIC
APPROVED BY UNDERWRITERS' LABORATORIES
WRITE for COMPLETE DETAILS
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THE LIQUIDOMETER CORP.
38-14 SKILLMAN AVE., LONG ISLAND CITY, N.Y.

either on Federal Reserve Board Index figures or on actual output. The former is indicated by (FRB). in the following table:

Product	Percentage of Change 1941-1946
Confectionery (FRB)	+13
Fats and oils (lb.)	+ 2
Fruits, processed (lb.)	+19
Manufactured dairy products (FRB)	—25
Meat (lb.)	+16
Meat packing (FRB)	0
Wheat flour (bbl.)	+32
Other manufactured foods (FRB)	+13
Vegetable, processed (lb.)	+18
Manufactured food Products (FRB)	+ 9

Surplus War Materials May Equip Food Plants

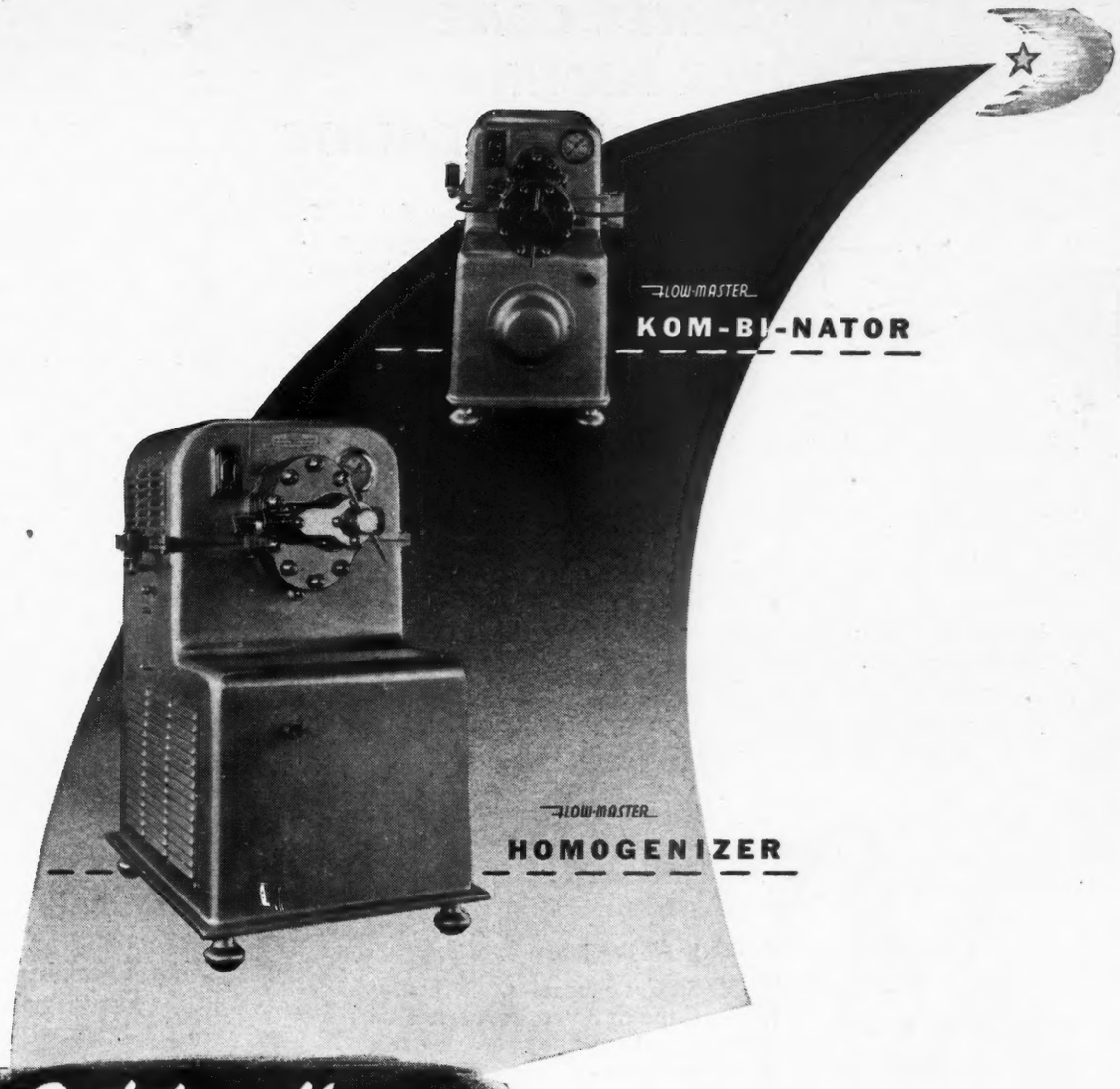
SURPLUS war material may be a source of industrial equipment and supplies that can be tapped by food processors in need of replacement items or material for construction. War Assets Administration has placed on sale to all classes of purchasers, including priority claimants, a great many standard commercial items. A recent announcement concerns surplus valves and fittings being offered at fixed prices based on jobbers' current net cost, less 40 percent discount, F.O.B. location. The valves and fittings come in a full range of pressure ratings —from 100 to 3,000 lb. Sales of surplus items are being conducted by the WAA's 33 regional offices where the inventories may be inspected.

DISTRIBUTION

Wheat Saving Holds Despite Heavy Crops

THERE is much speculation regarding the early lifting of bakers' restrictions on the use of wheat and the restoration of the larger loaf sizes, but the 10 percent cutback is still in force. The government is waiting to get a clearer picture of just what the grain supply is going to be before making any move. A canvas of the situation made in early August indicated that no action would be taken before October or possibly November.

The pressure is on to get the controls removed. There seems to be less need because of the 1,000,000,000-bu. wheat crop in prospect. The corn crop, which is officially estimated at 3,500,000,000 bu., will take much of the pressure off wheat. Feeders want corn. The distillers want corn. There is still a chance that there might be a lot of soft corn, but that is not likely. The



The *Outstanding* New Utility for Food Processors

The FLOW-MASTER makes possible new, low-cost processes, fast, continuous manufacture under absolutely accurate control.

Marco laboratory facilities and experience are available upon request to help you apply the FLOW-MASTER Principle to your production. Writé Marco Company, Inc., Laboratory C-9, Wilmington 50, Delaware.

FLOW-MASTER **Pumps—Homogenizers**
Kom-Bi-Nators
Equipment For The Process Industries

MARCO COMPANY Inc. Wilmington 50, Del.

DOES YOUR SPRAYER COME ANYWHERE NEAR MEETING THESE REQUIREMENTS

(determined by the U. S. Army Engineer Corps as necessary in a good sprayer)

- √ Corrosion resistant.
- √ Synthetic rubber hose, washers and gaskets that resist deterioration and swelling.
- √ All parts carefully machined and tightly fitted to prevent leakage of air or fluid.
- √ Two fine screen mesh strainers: one to strain as the tank is filled; the other to catch residue before liquid enters hose. Prevents nozzle clogging.
- √ Pressure gauge.
- √ Air-tight pressure compartment that needs to be pumped up to 50 lbs. pressure twice to empty tank of contents (2 gallon liquid capacity).
- √ Tank that requires only a minimum of care and cleaning: so constructed that it is easy to clean.
- √ Precision machining of carefully selected materials resulting in a tank that will give years of long hard service.
- √ Separate nozzles, for Flat, Mist, Cone or Solid Stream to assure accurate, finer, more even diffusion.
- √ Lightweight, yet rugged.
- √ Economical because of fine craftsmanship.
- √ *Was your sprayer approved and used by the U.S. Army throughout the war all over the world?*

Write to the Lofstrand Company for literature and names of dealers who handle the

LOFSTRAND

STAINLESS STEEL

SPRAYER

"Of course it costs more . . . but it's worth more than it costs."

THE LOFSTRAND COMPANY

DEPT. C — SILVER SPRING, MD.

corn was planted early and is maturing early. Last year the corn went into the ground late, it matured late and was caught by the first frost.

Officials are viewing the situation differently. In spite of the record wheat crop it is estimated that the total supply will be 150,000,000 bu. less than last year because of the smaller carry-over. It might be a good thing to build up the carry-over. If the amount of wheat used for feed is cut in two the 150,000,000 bu. can be made up from that saving alone.

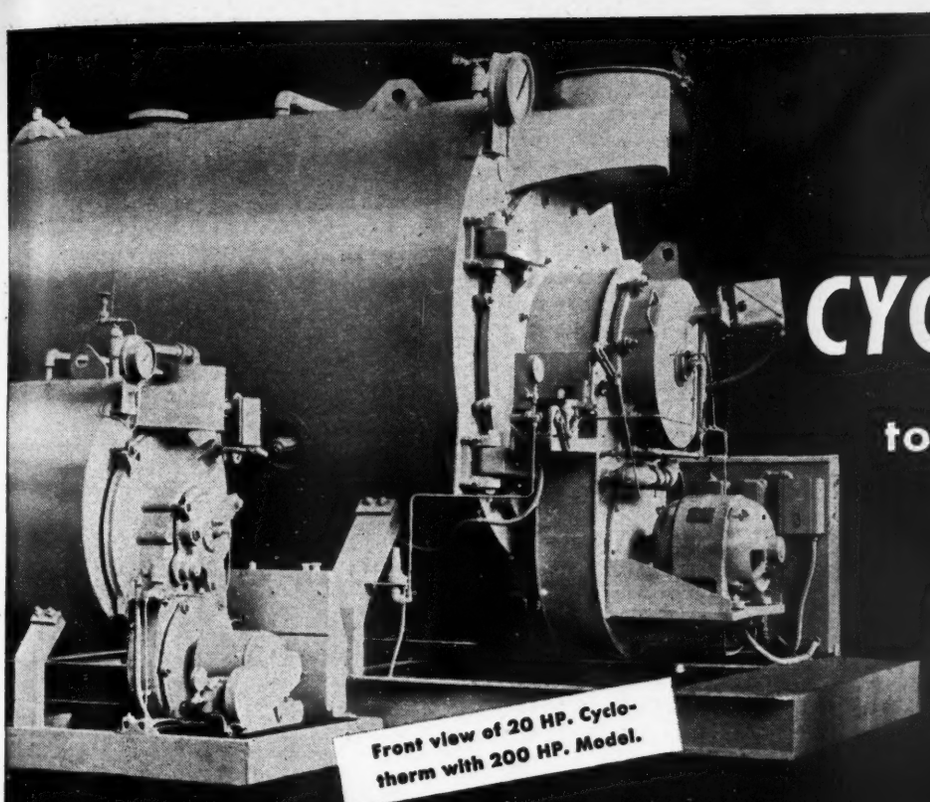
Some time ago it was stated that exports would be held to 250,000,000 bu. for the year ending June 30, 1947, domestic food would take 450,000,000 bu. and feed, 150,000,000 bu. This would result in a large carry-over. But there is a suspicion that the export figures may be revised upward. While the European crop is reported to be better, it is still below normal and the prospects of real help from Australia and other southern and Far Eastern producing areas is not bright at present. The Department of Agriculture has asked for an increase in the acreage planted to wheat next year and is frankly shooting at another billion bushel crop to put the country in a comfortable position.

Fish Freezing Plans Developed by Norway

WITH the war-developed deep-freeze process threatening to revolutionize the whole Norwegian fishing industry, the Norwegian State Fisheries Department is perfecting a plan to provide Norway with a nation-wide network of quick-freeze and cold storage units linked by a comprehensive system of refrigerated transport.

Norwegian Minister of Fisheries, Reidar Carlsen, gave some indication of the scope of the new project in a recent interview. Referring to the need for national planning in this venture, Minister Carlsen said, "How might the development of our road and railway systems have progressed had we been concerned only with the cost of these projects?"

The proposed system, briefly outlined, calls for modern deep-freeze plants as close to the fishing banks as possible. Specially built refrigerated ships will then load the frozen fillets at these points direct for the overseas markets and for distribution centers further south, from which domestic consumers will be supplied. From these terminal points, the fish will be loaded into refrigerated railway cars and



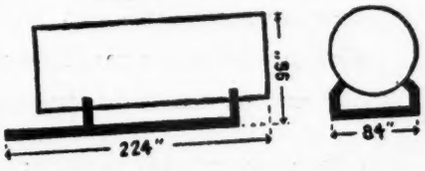
Front view of 20 HP. Cyclotherm with 200 HP. Model.

There is a CYCLOTHERM to meet every need for STEAM

Note these favorable "go thru" dimensions

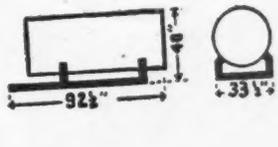
Cyclotherm steam generators are manufactured in convenient sizes from 10 to 200 HP and with operating pressure from 15 to 200 psi. A Cyclotherm may be installed anywhere and functions without special foundation or stack.

200 H. P. MODEL



100 H. P. MODEL

20 H. P. MODEL



Designed for highest efficiency with minimum operating and maintenance expense

Whatever your use of steam, there is a dependable Cyclotherm to do your job—and do it economically.

Initial cost and installation expense are low. Cyclotherm units are complete steam generating plants and are delivered to your door ready to operate on arrival.

Cyclotherm will minimize your operating and maintenance expense. The Cyclotherm exclusive method of combustion and heat transfer assures you of the highest operating efficiency. Simplified two-pass design makes maintenance problems easy. Larger sizes have hinged front assembly and rear door making tubes and furnace readily accessible.

Cyclotherm is manufactured in convenient sizes from 10 to 200 HP and with operating pressures from 15 to 200 psi. Units may be fired with any liquid or gaseous fuel and all operation is fully automatic. Heavy oil operation available in sizes 50 to 200 HP with automatic modulating controls. All sizes are also available with the Cyclotherm special combination burner arrangement to fire either oil or gas.

Wire, write or phone for more information

CYCLOTHERM STEAM GENERATORS

CYCLOTHERM CORPORATION, 90 BROAD STREET, BOX 201, NEW YORK 4, N. Y.

MERCOID CONTROLS

Mercoid Controls are first choice among leading engineers throughout industry. They are used on industrial applications involving the control of temperature and pressure. Available in various ranges. Controls also for liquid level, etc.

Hermetically sealed mercury switches used exclusively in all Mercoid Controls. They are not affected by dust, dirt or corrosion, thereby assuring better control performance and longer control life. Complete catalog sent upon request.

MADE BY THE MERCOID CORPORATION
4221 BELMONT AVE. CHICAGO 41, ILL.

trucks for transportation to central distribution centers, and from there to local retail establishments.

According to the plan, refrigerated land transport will make the south-north return trips loaded with frozen meat, berries and vegetables for consumption in the less productive northern areas.

Certain phases of this development were under way even before the nationwide plan was perfected. Private shipping firms have already, with State sanction, contracted for 14 small, high speed refrigerated vessels averaging 700 to 800 tons.

BAI Will Resume Law Enforcement Activities

ENFORCEMENT of the Meat Inspection Act, the 28-hr. law and related functions will be returned to the Bureau of Animal Industry October 1, 1946, it has been announced by USDA. These activities are currently carried out by the Production and Marketing Administration, under a war emergency measure in effect since December 5, 1942.

The 28-hr. law requires the unloading of livestock every 28 hr. for feeding, watering and rest.

Steel Drum Shortage Shows No Improvement

PRESENT shortage of steel drums is not going to be relieved in the near future in spite of the optimistic reports that sheet mill capacity is to be increased 300,000 tons to 16,000,000 tons annually before the end of the year. Production of drums, kegs and pails is running about 7,000,000 units per month according to the latest CPA figures. Orders on the manufacturers' books continue to climb and have passed 30,000,000.

The situation is expected to get worse before it is better, since container users have about exhausted ideas for the reuse of old drums. The industry has been warned that there is not enough sheet steel available. The situation cannot be improved by extending priorities.

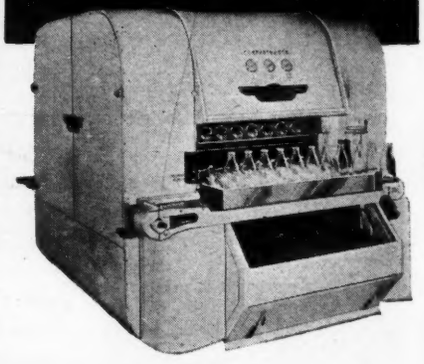
Dairy Promotion Aims At Rebuilding Markets

THE American Dairy Association recently announced plans for a $1,000,000 promotion program for dairy foods, aimed at maintaining consumer gains made on certain dairy products during the war and rebuilding the market for those that have declined during that period.

Promotion will be carried out through extensive and timely advertising in magazines, newspapers,

REDUCE OPERATING COSTS *with the* VIKING Bottle Cleaner

Handle Square Bottles Without Adjustment



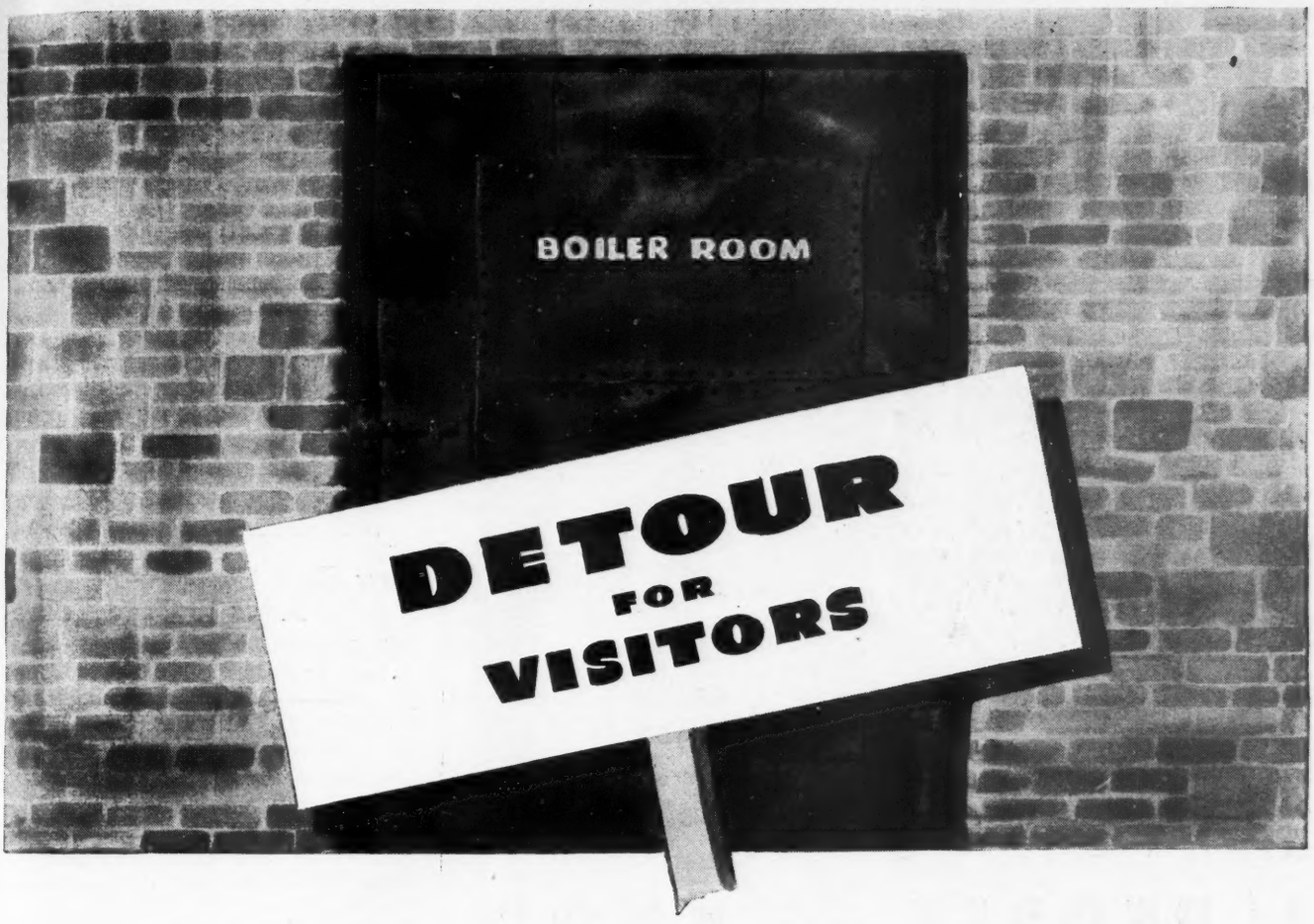
The VIKING insures immaculate bottle cleaning and reduces operating costs, too. Caustic solution is conserved — maintenance costs are extremely low — less floor space is used. Because of its simple, rugged design, the new square bottle can be handled in the same machine without any mechanical adjustments.

Other advantages include:

- ✓ Simple loading
- ✓ Long submerged soak
- ✓ Double inside and outside hydro scrubbing with mild alkali solution.
- ✓ Hydro pressure rinse
- ✓ 20-90 bottles per minute.

Write today for latest information, stating your own process requirements

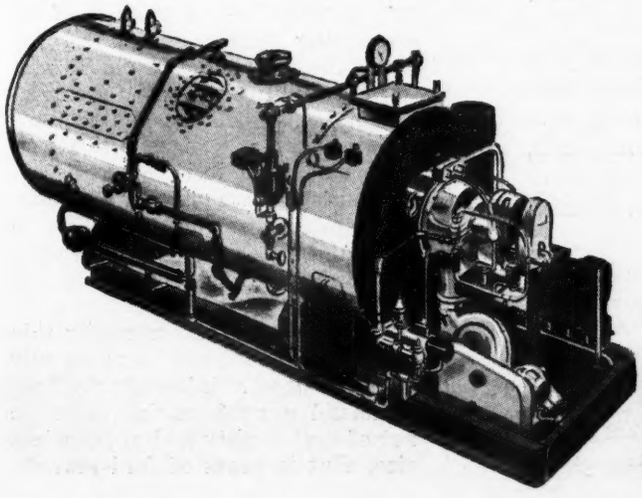
BARRY-WEHMILLER MACHINERY COMPANY
1946 . . Our 61st Anniversary
ST. LOUIS MO., U. S. A.



Ashamed of Your Boiler Room?

IS your boiler-room taboo for visitors? Are its appearance and condition such that you are not proud to say it's part of your plant or building? There is a quick, sure remedy for an "eye-sore" boiler-room—replace your old steam plant with a modern, oil-fired Cleaver-Brooks steam generator. Its modern design and construction—its clean, smokeless, efficient operation (no ashes, dirt, or soot to contend with) assure a "show-place" boiler-room at all times.

CLEAVER-BROOKS CO., 327 E. Keefe Ave., Milwaukee 12, Wis.

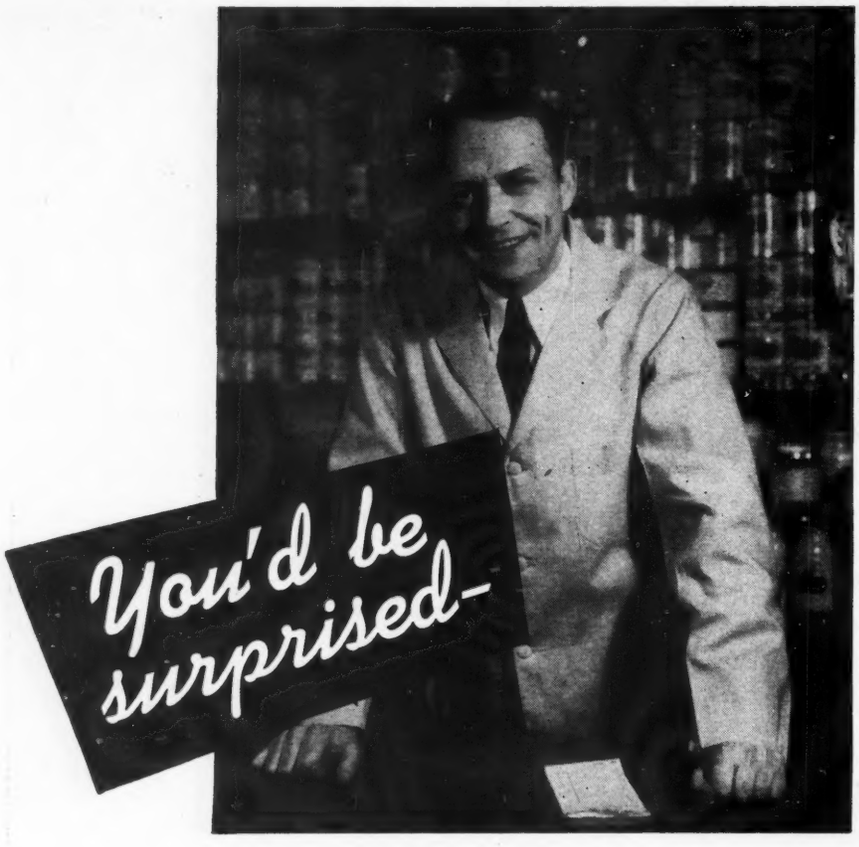


A custom-planned, application-engineered Cleaver-Brooks Steam Generator installation has made lower fuel and steam costs a reality in scores of plants. Here are some of the reasons:

- A steam plant tailored for your job. Cleaver-Brooks analyzes your load conditions, space and equipment arrangements, future growth needs, puts unit into initial operation, instructs as to operation, care, maintenance.
- Designed for utmost convenience of operator—all controls may be operated from front of boiler. A factory engineer puts unit into initial operation, and trains your employees in operation, care, maintenance.
- One source and one responsibility for the complete generator—Cleaver-Brooks factory-finished and tested—a fully "packaged" unit meeting all code requirements.
- Fast installation. No special foundation needed. Within 24 hours after arrival, your Cleaver-Brooks Steam Generator can be in operation.
- No smoke-stack required; simple roof-high vent exhausts combustion gases.
- Saves space, uses less plant area, fits into low head-room locations.
- Oil-firing eliminates smoke, ashes, clinkers, messy boiler-room conditions.
- Low operating costs; unsurpassed guarantee: — 80% thermal efficiency; 13% CO_2 gases; stack temperature not to exceed 125° F. above standard steam temperature.
- Quick steaming—for any emergency or fluctuating loads—through high heat transfer with Cleaver-Brooks 4-pass down-draft construction and integral oil-burner.
- Full-size range is available—22 models in sizes from 15 to 500 h.p., at steam pressures from 15 to 200 lbs. p.s.i. Write for bulletin and complete information.

Cleaver-Brooks
STEAM
GENERATORS

WRITE on your business letterhead for the Free Steam Cost-Calculator — a ready-reference slide rule showing the comparative steam costs when using oil or coal as fuel.



PEOPLE *do* KNOW ABOUT VITAMINS

To MORE and more consumers, vitamin fortification is becoming a major sales factor.

For instance, surveys show that at least 50% of the American people feel that nutritional goodness is important in the foods they consume. For many food products, this is a sales opening not to be ignored—particularly for those foods which are purchased by housewives with children.

Surveys show that women are keenly aware of the nutritional importance of vitamins, especially vitamin D. Women are *better acquainted with vitamin D than any other vitamin*, know that vitamin D can be supplied easily by incorporation in some foods.

The market is here. This may be your opportunity to take advantage of a promising situation for product improvement and competitive leadership. If you have a food product which can be fortified with vitamin D, our technical experts will be glad to give you whatever information you may require in respect to fortification problems and methods.

Write today for full information regarding Vitamin D (A.R.P.I. Process) and its possible incorporation in your product.

General Mills, Inc. *Special Commodities Division*

MINNEAPOLIS 15, MINN. 80 BROAD STREET NEW YORK 4, N.Y.

grocery store posters, and radio. The program is designed:

To maintain and expand the market for all dairy foods, to make the public conscious of new uses for dairy foods, to reestablish and develop point-of-sale merchandising activity, to build public acceptance of the dairy industry and its products and to provide research on products and markets.

A year-round drive to increase producer and plant-operator support of the association, and thus increase membership has also been planned.

RAW MATERIALS

Low Corn Carryover Adds to Crop Value

WITH carryover stocks of corn expected to drop to 170,000,000 bu., by October 1, the corn processing industry was anxiously watching developments in the 1946 crop, during August. The generally favorable predictions being made by the BAE, indicating a record crop were somewhat offset, in the case of sweet corn, by the Corn Canners Service Bureau, which indicated, on August 8, that the yield was likely to be lower than had been previously estimated.

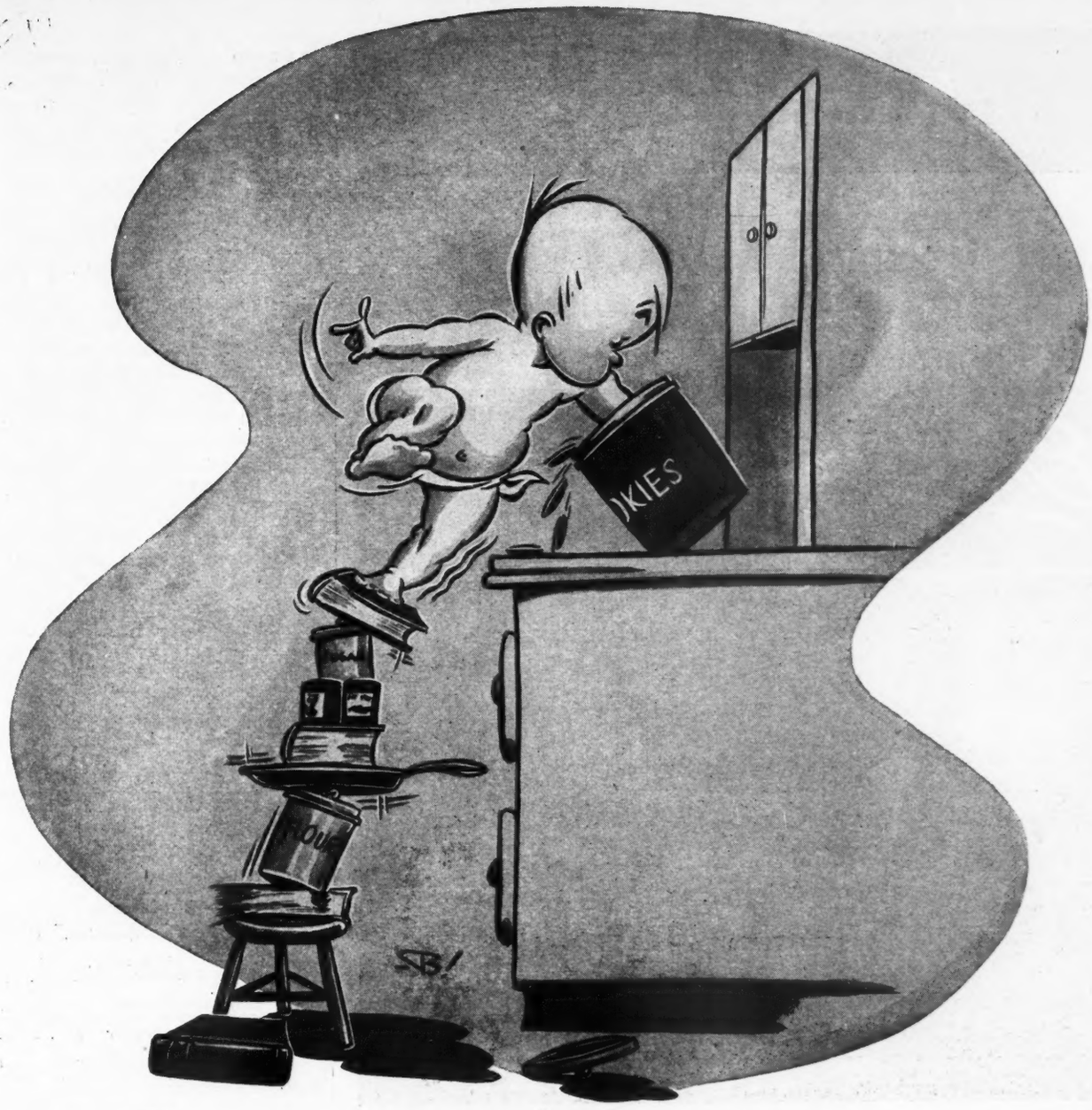
Basing its estimate on overall conditions, August 1, the BAE estimated a crop of 3,496,820,000 bu., which would surpass the 1945 crop of 3,018,410,000 bu.

The estimated carryover contrasts with 311,000,000 bu., held Oct. 1, 1945 and with a 1937-41 average of 469,000,000 bu. on October 1.

Dried Sweet Potatoes Used As Stock Feed

DRYING of whole sweet potatoes not desirable for market, like "strings" and "jumbos," gives promise of an interesting feed material, according to the conclusions of the Bureau of Agricultural and Industrial Chemistry. Such desiccated material makes an excellent livestock feed comparable in value with corn. A full crop grown only for feed purposes might provide, according to bureau figures, as great a feed yield per acre as can be produced in any other way.

It is expected that normally this dried potato feed will be made only from the sweet potatoes that can not command a good market, because not of first quality and appropriate size. But in years of feed scarcity



Ingenuity PAVED THE WAY!

Ingenuity paves the way in modern container-making too! **National,** through its ingenious application of materials and methods, explores all the possibilities of metal packaging to help solve your problem.

Under the capable supervision of craftsmen . . . on specially developed equipment . . . in plants strategically located, **National** produces a complete line of metal containers that will protect your product on the commercial highways of today.

Our sales representatives, technical and laboratory staffs are available to you without obligation. Sales offices and plants in principal cities.

NATIONAL CAN CORPORATION

Executive Offices: **110 EAST 42nd ST., NEW YORK 17, N. Y.**

Mathews

GRAVITY ROLLER CONVEYERS

Engineered to serve Production

The 2½" diameter roller with sealed heads and 22SH Bearings resulted from considerable effort over many years toward developing a really sanitary dairy conveyer roller. It can be washed down with water or steam, and is designed for application under wet conditions. 4" channel frames are used with this roller, the rollers being held in place in the frames by lockbars. There is a Mathews Engineer operating in your vicinity. He will give you complete information about Sanitary Roller Conveyer for cases and cans, and will also tell you about the many other types of Mathews Conveyers which have been engineered to serve production.

MATHEWS CONVEYER COMPANY
ELLWOOD CITY, PENNSYLVANIA
SAN FRANCISCO, CAL. • PORT HOPE, ONT.
ENGINEERING OFFICES IN PRINCIPAL CITIES

or potato surplus, entire crops may most economically be dried, it is forecast. This development is an outgrowth of a much earlier bureau investigation of sweet potato starch manufacture.

Hybrid Corn To Yield 80 Percent of Total

SLIGHTLY more than 2 out of 3 acres, or 67½ percent of the total corn acreage planted in 1946 is in hybrids, according to a recent estimate of the Department of Agriculture. In 1933, only 1 acre in 1,000 was planted in hybird seeds, in 1939 the acreage had grown to 1 acre in 4 and in 1943 it was 1 acre in 2.

Nearly seven-eighths of this hybrid acreage is in the North Central States, with Iowa at practically 100, Illinois and Indiana, 99, Ohio, 97, Minnesota, 94, Wisconsin, 92 and Missouri, 91 percent. Because of the high yields in the corn belt, it is expected that four-fifths of all corn production, in the U. S. this year, will be grown from hybrid seeds.

SCHEDULE OF EVENTS

September

9-11—National Coffee Association, annual convention, Edgewater Beach Hotel, Chicago.
9-13—American Chemical Society, 110th national meeting and National Chemical Exposition, Coliseum, Chicago.
12-13—Cornell University, 2nd annual dairy industry conference, Ithaca, N. Y.
15-18—Southern Bakers Association, annual convention, Edgewater Gulf Hotel, Edgewater Park, Miss.
16-20—Instrument Society of America, first national conference and exhibit, Wm. Penn Hotel, Pittsburgh.
25-26—University of Minnesota, Department of Agriculture Short Course, Buttermakers' Symposium, University Farm, St. Paul, Minn.

October

7—National Safety Council, safety congress, Hamilton Hotel, Chicago.
12-17—Master Brewers Association of America, 40th annual convention, and 3rd brewing and equipment exposition, Navy Pier, Chicago.
13—American Bakers Association, Hotel Sherman, Chicago.
14-18—American Dietetic Association, 28th annual meeting, Netherlands Plaza, Cincinnati, Ohio.
21-26—Dairy Industries Supply Association, 15th Exposition, Atlantic City.
21-23—International Association of Milk Dealers, convention, Atlantic City.
24-26—International Association of Ice Cream Manufacturers, convention, Atlantic City.
23-25—National Bakers Supply House Association, annual fall convention, St. Francis Hotel, San Francisco.
29-Nov. 1 — Refrigeration Equipment Manufacturing Association, 4th all-industry refrigeration and air-conditioning exposition, Public Auditorium, Cleveland.

November

19-21—American Bottlers of Carbonated Beverages, 28th annual meeting, Miami, Fla.
25-26—Packaging Institute, 8th annual convention, Stevens Hotel, Chicago.
25-26—American Butter Institute, annual meeting, Morrison Hotel, Chicago.

Changes in Food Supplies

(Indicators)

Production

Flour production in July reached 13,874,921 sacks, an increase of 3,797,276 sacks from the previous month, the first such increase since February, according to the Northwestern Miller, whose estimates are based on approximately 71 percent of the total. This compares with 16,142,668 produced in July, 1945, but is slightly more than the flour produced in July, 1944 and 1943.

Durum wheat production came to 711,914 sacks, in July, which was 81,999 sacks above June, but 4,933 sacks under July, 1945. The Northwestern Miller bases these estimates on approximately 99 percent of the total production.

Casein production in the U. S. will meet not more than 20 percent of domestic requirements of 25,000,000 lb., according to the industry committee reporting to CPA. Efforts to import 20,000,000 lb. were stymied by price controls, it was claimed.

Liquid egg production, during June, totaled 99,212,000 lb., compared with 81,122,000 lb., in June, 1945, an increase of 22 percent. Of the June total, 46,581,000 lb. were frozen; 51,863,000 lb. were dried, producing 15,761,000 lb. of dried egg power, and 768,000 lb. were used for immediate consumption. This represents a sizable increase over June, 1945 for dried eggs and a decrease for frozen eggs.

Creamery butter production was estimated at 119,585 lb., for June, an increase of 5 percent over May, but 30 percent below June, 1945 and 40 percent under the five year average for June.

American cheese production, during June, came to 96,445,000 lb., about 6 percent more than the previous month, but 14 percent below the June output, last year.

Salad dressing, mayonnaise and related items totaled only 46,800,000 gal., in 1945, a drop of 12,000,000 gal. under the 1944 production.

Materials

Green pea production for processing was estimated at 531,200 tons, on July 15. This is 8 percent above the July 1 estimate and exceeds 1945 production of 496,810 by 7 percent. The 1935-44 average was 309,940. A yield of 2,165 lb. per acre was also indicated, which is exceeded only by the 1945, 1920, and 1918 yields.

Durum wheat production for 1946, is estimated at 35,000,000 bu., by Glenn G. Hoskins. The prediction is based on an expected yield of 15 bu. or more per acre, and compares with the 1945 crop of 32,913,000 bu.

Pigs saved in the spring pig crop are estimated at 52,300,000, about 1½ percent above the 1945 spring crop, but 29 percent below the 1943 record crop. Reports show only 4,600,000 sows being kept for fall farrow, down 16 percent from a year ago. Assuming average litters, the fall pig crop will total about 29,000,000 head, 17 percent below last fall and the smallest fall crop since 1938. The combined crops are estimated at 6 percent less than in 1945.

In Storage

Canned fruit stocks for civilians were below 5,000,000 cases, on June 1, about 650,000 cases under the low figure on the same date, last year and about 22,000,000 cases less than the holding June, 1942. Canned juices and canned vegetables on the other hand, were in favorable supply.

Frozen fish and shellfish holding increased 13,000,000 lb. during June and on July 1 totaled 97,806,000 lb. This was 67 percent above stocks held on the same date in 1945 and 35 percent above the five-year average. August 1 holding were estimated at between 112- and 117,000,000 lb.

Freezer occupancy increased from 80 to 86 percent, between July 1 and August 1, leaving such occupancy 6 points above the five-year average for August 1. Cooler occupancy dropped from 79 percent on July 1 to 76 percent on August 1, but is 5 percent above the average for the date.

Indexes

Business Week's index of business activity, for the week ending August 10, was 185.0, which compares with 177.8 a month ago and 209.6 a year ago.

The commodity index on food, compiled by the New York Journal of Commerce, stood at 156.0 for the week ending August 16. The July average was 140.03 and August, 1945 index reached 110.4.

CONSTRUCTION NEWS

	Awarded Pending (thousands)	Awarded August (thousands)	Total Awarded 1946 (thousands)
Bakery	$ 430	$	$ 4,019
Beverages	405	195	22,231
Canning and Preserving	....	125	5,913
Cold Storage	936	120	6,746
Confectionery	100	....	2,380
Grain Mill Products	2,393	1,375	11,424
Ice, Manufactured	117	....	960
Meats and Meat Products	1,750	182	1,906
Milk Products	1,210	1,213	8,974
Miscellaneous	2,540	1,095	14,313
	$ 9,881	$4,305	$78,866

WATER FOR FOOD PROCESSING STERILIZED BY BREAK-POINT CHLORINATION

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WALLACE & TIERNAN
NEWARK 1, NEW JERSEY
REPRESENTED IN PRINCIPAL CITIES

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Vi-Co Plasmolyzed Yeast Extracts are prepared by enzyme digestion of brewers' yeast to yield a B complex product rich in essential amino acids. Amino acids provide the necessary "building blocks" for healthier and stronger bodies.

These products possess a definite "meat-like" flavor useful in enriching soups, bouillon cubes, tomato juice and other packaged foods. Such enriched foods are also of value for their natural B complex and high amino acid composition.

Consult us about your vitamin or yeast problems. Our technical staff can best advise you how Vi-Co products can be used to enrich your own products.

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AMAZING STRENGTH

Plus lightness in weight for utmost wearing comfort.

6 COLORS — 4 SIZES

PRICES — SIZES — COLORS

WHITE—4 Mill Plastic
27 x 36..$6.62 per doz.
30 x 36.. 7.53 per doz.
36 x 40.. 7.96 per doz.
36 x 44.. 8.85 per doz.
Full Length Sleeves $6.00 per doz. pair

BLACK or WHITE— 8 Mill Plastic
27 x 36..$8.17 per doz.
30 x 36.. 8.87 per doz.
36 x 40..10.10 per doz.
36 x 44..12.38 per doz.
Full Length Sleeves 9.96 per doz pair
Leggings, Hip Length 11.90 per doz. pair

BLACK or WHITE— 12 Mill Plastic
27 x 36.$12.91 per doz.
30 x 36. 13.95 per doz.
36 x 40. 16.57 per doz.
36 x 44. 17.62 per doz.

MAROON, Heavy Double-Coated Neoprene
27 x 36.$10.61 per doz.
30 x 36. 12.60 per doz.
36 x 40. 16.50 per doz.
36 x 44. 18.45 per doz.
Full Length Sleeves 12.90 per doz. pair
Leggings, Hip Length 23.50 per doz. pair

BLACK, Heavy Double-Coated Neoprene
27 x 36.$10.61 per doz.
30 x 36. 12.60 per doz.
36 x 40. 16.50 per doz.
36 x 44. 18.45 per doz.
Full Length Sleeves 12.90 per doz. pair
Leggings, Hip Length 23.50 per doz. pair

BLACK or WHITE— Extra Heavy 20 Mill Plastic
27 x 36.$12.90 per doz.
30 x 36. 14.00 per doz.
36 x 40. 18.33 per doz.
36 x 45. 20.50 per doz.
Full Length Sleeves 12.90 per doz. pair
Leggings, Hip Length 23.50 per doz. pair

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Minimum order 1 dozen.

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What Washington Thinks

By R. S. McBRIDE, Washington, D. C.

"TO KEEP ABREAST"—Food technologists can cite to their managements a recent decision of the wealthy Mellon family, of Pittsburgh, founding a new organization, which is intended to keep that group abreast of new developments. Announcing the plan it was stated, "The pace of the world today often demands immediate decisions and actions." It is evident that this is even more true for individual food manufacturers and for whole groups in the food industries. If one of the outstanding and successful investment groups of the country is worried about its ability to keep up with current events, we might well ask how about an individual food company. Fundamental and comprehensive research is the only answer.

OCCUPATIONAL DEFERMENT—When the new Selective Service law took effect, it was first decided that practically every able-bodied man from 19 to 29 would be called for service unless he was already a veteran or a papa. After a little more deliberate thought, Washington revised that drastic plan. It is now the policy to give occupational deferment to those who are really essential either in scientific, engineering or skilled artisan service to an essential industry, like food. Arguments for an individual must be presented to the local board first. The Civilian Production Administration, in Washington, will review appeal cases and it is expected to grant deferment for key persons really needed. A clear technologic definition of the need will be most important to secure favorable review on appeal.

SUGAR GLOOMS—Two major factors indicate that the prospect for sugar in food manufacture remains gloomy for 1947. Unofficially Washington executives admit that there is little or no chance for an increase in supply from Cuba next year. And peace in the Netherlands Indies seems far away. If the European beet sugar crop should be large, then the United States might get a slight increase in its share from the Caribbean region. But that is a slim hope.

TRADE-MARK LAW—Food manufacturers have nearly a year in which to establish firmly trade-mark rights, both those now held and those wanted under the new trade-mark law signed by the President, recently, to become effective July 5, 1947. Food technologists must review all of the package and publicity material of their companies to identify the technical points on which protection is needed. These points should be made clear to the sales management and the legal advisers of the company promptly. The new statute makes entirely different trade-mark practice necessary in a number of cases. Some minor technical slip may be quite serious, since established merchandising position may be lost quite readily under the new act. It looks like a big job for the patent attorneys, and one in which technology will have to take a hand from time to time.

OWN A MICROSCOPE—Food inspectors continue to be very fussy about contamination of foods with filth. As previously pointed out in FOOD INDUSTRIES, a single insect fragment may condemn a big shipment of goods. And, when the inspector visiting a factory fails to find adequate laboratory equipment, including a microscope, he becomes increasingly "tough" as he reasons that the management is not making every reasonable effort to achieve food cleanliness. Apparently every food plant should own a microscope, AND USE IT.

BOTH MORE AND LESS—Price controls are being removed gradually; but the more drastic goods controls of wartime are being reestablished in many cases. It looks as though the purchasing agent of every food company is going to have to fight out his battles for supply with CPA executives in a good many cases. But long-term planning, without violation

CHANGE OF ADDRESS

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330 WEST 42nd STREET, NEW YORK 18, N. Y.

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Name .....

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New Address .....

New Company Connection .....

New Title or Position .....

of maximum limits on inventory, is just as important now as during the war period to prevent interruption of manufacture.

WHICH ONE THIRD?—For a long time Washington has heard from New Dealers that one-third of the American people are underprivileged and undernourished. Now comes the international agency, Food and Agriculture Organization, to tell us categorically that only one-third of the people of the world normally get enough to eat. Washington is wondering whether FAO expects that the American people will grow and give away indefinitely enough food to bring world diet standards up to what the nutritionists would recommend. Actually, the paying of the bills for that purpose is less of a problem than the question as to where that quantity of food could come from.

ARMY FOOD BUDGET—War Department figures have just been released regarding the cost per soldier per year for food. Uncle Sam reports that the Army spent for this purpose $215.45 in 1944, $226.30 in 1945, and $233.92 in 1946. It is interesting to note that the increase of 3.3 percent from 1945 to 1946 is only one-third as great as the increase on the average for all Quartermaster supplies and maintenance. Barracks equipment, for example, doubled, and clothing cost 11 percent more.

SILVER AVAILABLE — Congress finally passed a law just before adjournment raising the ceiling price on silver to 90.5 cents per troy ounce. This will increase the cost of this valuable equipment-surfacing metal; but it makes it again available because the Treasury Department both can and will sell silver at this price for essential uses. In comparing silver with tin, for example, it is probably safe to assume that the tin price also will rise before long. In recent negotiations with Bolivian ore producers, Uncle Sam has agreed to pay much more per pound of tin to be processed, and processing costs in the Texas smelter have gone up sharply. If and when the Government subsidy on tin is cancelled, the price of that metal will jump abruptly. An accurate economic comparison of different equipment-coating metals is at the moment very difficult.

THE THREE "DEACONS"—Washington chuckles at the nickname "deacon" for the members of the Decontrol Board named by the President. Actions of that agency are going to eliminate many price ceilings from food for the benefit of the sales management. Many controls on price of food plant equipment have already been removed and more will go off rapidly. Thus, the worries of the plant engineer are transferred from OPA to CPA where he may still hope to get priorities.

Ethavan, Monsanto's Ethyl Vanillin, a flavor principle with a "vanilla-like" odor and flavor, used as an aroma fixative in the formulation of vanilla flavorings.
Coumarin Monsanto, a synthetic odor principle, used to enhance Vanillin Monsanto or Ethavan in vanilla flavorings.
Methyl Salicylate, Monsanto, U.S.P., Synthetic, Monsanto synthetic oil of wintergreen, used to impart pleasant taste to cookies and cakes.

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Try them! Samples of any or all of these Monsanto synthetic aromas will be sent on request. Contact the nearest Monsanto District Office, or write MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second St., St. Louis 4, Missouri. District Offices in: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

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In a Celite filter cake these particles, greatly varied in shape and size, overlap and interlace to form a fine filter coating, with openings smaller than the tightest filter cloth. This coating traps out suspended impurities and allows only clear liquid to emerge.

Johns-Manville produces 9 Celite Filter Aids of varying degrees of fineness to provide every desired combination of clarity and flow in the filtering of sugars, syrups, fruit juices, fats and oils, vitamins, drugs, lubricants, and many other liquids.

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MEN • JOBS • COMPANIES

INDUSTRY

Beatrice Foods Co. has purchased a tract of land in St. Louis, Mo., on which it will erect a new dairy plant and condensery.

Bird's Eye-Snider, Inc., is operating its new plant at Walla Walla, Wash. The unit employs a number of novel engineering features, including a straight-line processing system. Its capacity is 280 tons of peas a day. Peaches, spinach and carrots will be handled later in the year.

The California Prune & Apricot Growers Association has begun construction in San Jose, Calif., of a $170,000 concrete warehouse.

Campbell Soup Co. hopes to begin operations in Sacramento, Calif., on tomato products for use by its Eastern plant during the 1947 season, even though the $2,000,000 plant there will not be completed by that time. O. C. Zinn, purchasing agent, said he believes a boiler house, tomato plant and the warehouses will be ready for the 1947 tomato pack, but production of the firm's regular line of soups probably will be held up until 1948.

Centennial Flouring Mills Co., Tacoma, Wash., reports it expects completion of a $200,000 seven-story plant by October. The new structure will not add to the capacity of the present plant, but will allow more efficient arrangement of present machinery. The company also plans construction of a warehouse to ease loading problems.

Comstock Canning Corp., Newark, N. Y., announces that it has purchased the plant, equipment and goodwill of the Holley Canning Co., Holley, N. Y. The Holley Co. was founded in 1900 and packs peas, cherries, tomato products, apple sauce, apple juice and vinegar stock. Harlan D. Munger, former president of Holley, will remain as manager in charge of operations which will be continued and expanded.

Corbin Foods Co. recently has been formed to engage in the manufacture and distribution of a group of food products under the Colonial Kitchen brand. Principal of the new firm is Lt. Col. Arnold Corbin.

Derby Foods, Inc., Chicago, a subsidiary of Swift & Co., and processor of peanut butter and meats in glass and tin containers, plans a $392,000 addition to its plant.

General Mills, Inc., has awarded contracts for two new manufacturing plants in California. A cereal plant for packaged food products will be located at Lodi and a modern flour mill will be erected at Los Angeles. Construction and operation will be under the supervision of Edward O. Boyer, president of the Sperry Division, with headquarters in San Francisco.

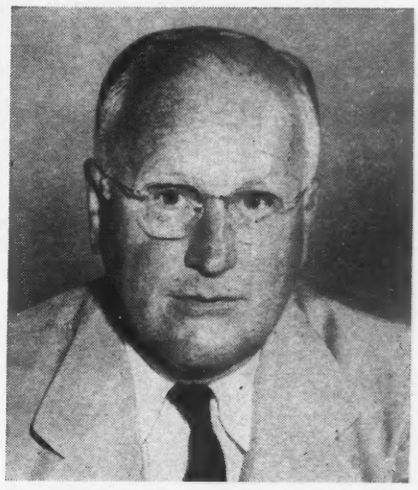
Charles E. Hires Co. has opened a large bottling plant in East Providence, R. I., the first of a series of fifteen bottling units to be established along the Eastern seaboard.

Jacobs Candy Co., New Orleans, La., has been purchased by Universal Match Corp. of St. Louis, Mo. A. H. Rosenberg, president of Universal, states that his corporation plans to modernize and enlarge the Jacobs plant.

Kungsholm Baking Co., Chicago, recently purchased the Century Biscuit Co. of Indianapolis, Ind.

Matson Navigation Co. has chartered two refrigerator ships through the War Shipping Administration to carry cargo to Hawaii, during conversion from government operation to private shipping. Their capacity, 100,000 cu. ft. of reefer space, 1,200 tons of dry cargo each, will be supplemented by other ships regularly operated by Matson during the changeover period.

R. I. McLaughlin Co., Inc., plants at Gresham and Beaverton, Oregon, have been acquired by the Tea Garden Products Co., San Francisco, according to an announcement by T. N. St. Hill, president of the firm. The two plants will be operated as a subsidiary of the Tea Garden Co. and will continue to use the original name. They have been supplying frozen berries to the preserving, ice cream and confectionary industries.



JOHN M. STROUP

At its annual meeting in Sandusky, Ohio, the National Kraut Packers Association elected John M. Stroup president, succeeding Alden C. Smith, who had headed the organization during the war years.

Pan-Am Freezers, Inc., Brownsville, Tex., is planning an expansion program that calls for ready cooked, quick frozen plate lunches, packed and stored in pressed aluminum plates ready for the dinner table. The project will start off with the cooking and then the quick freezing of single unit dishes such as Mexican chili and tamales, but ultimate plans call for a complete dinner.

The Welch Grape Juice Co. has announced plans to construct a $750,000 plant at Wenatchee, Wash.

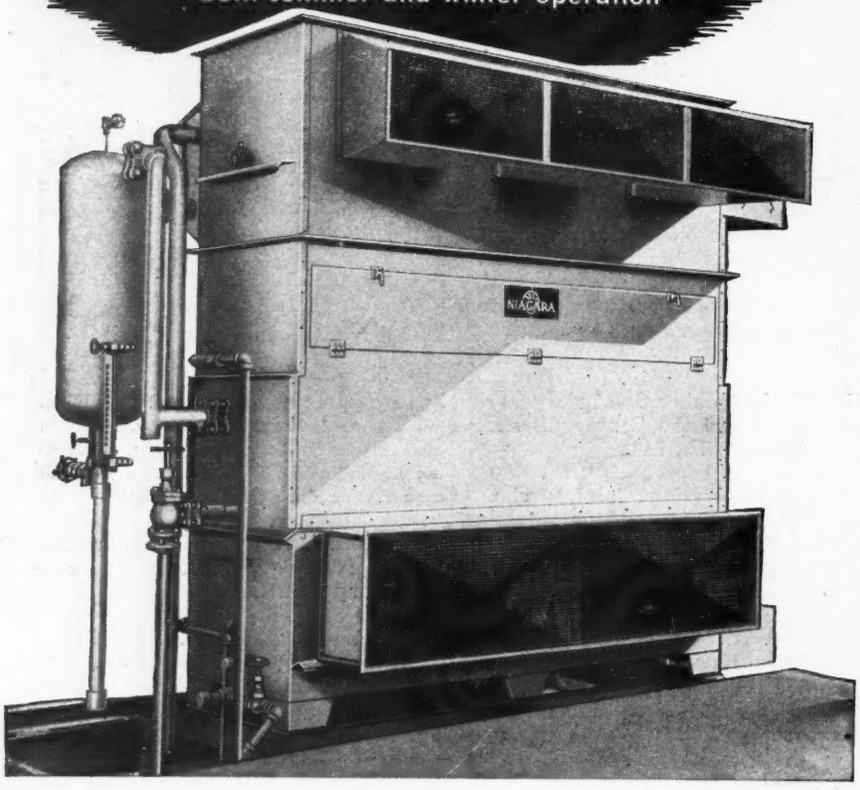
DR. R. W. TRULLINGER

DR. JAMES T. JARDINE

Having served since 1931 as chief of the Office of Experiment Stations, U. S. Dept. of Agriculture, Dr. James T. Jardine has retired. He is succeeded by Dr. R. W. Trullinger, formerly assistant chief.

The NEW AERO-PASS CONDENSER

. . . with Automatic Control for both summer and winter operation



● To increase your plant output of product, first open the bottleneck of refrigeration capacity.

Install the NIAGARA AERO-PASS CONDENSER and your refrigeration plant operates with a smaller differential between suction pressure and head pressure, gaining for you both an increase in capacity from your compressors and important savings in expense for power.

The new NIAGARA AERO-PASS CONDENSER offers its advantages protected from the danger of loss through shut-downs and maintenance troubles. The 10-year record of Niagara Condensers for dependable full capacity operation is unequalled.

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JOHN H. BIER

Until recently, manager of the San Jose, Calif., plant of Clapp's Baby Foods, John H. Bier has been named general production manager of all Clapp's operations. Announcement was made by H. W. Roden, president of American Home Foods, Inc., the parent company.

PERSONNEL

Nathaniel Baron has been elected president of H. Baron & Co., Inc., Linden, N. J. The company, founded in 1875, manufactures fruits, sirups, preserves and flavoring materials.

Francis N. Branson, former legal counsel and assistant to the vice-president of Webster Chicago Corp., Chicago, recently was appointed executive assistant to the National Confectioners' Association, succeeding Thomas A. Ryan. Mr. Ryan has joined the staff of the Sanitary Automatic Candy Corp., Chicago.

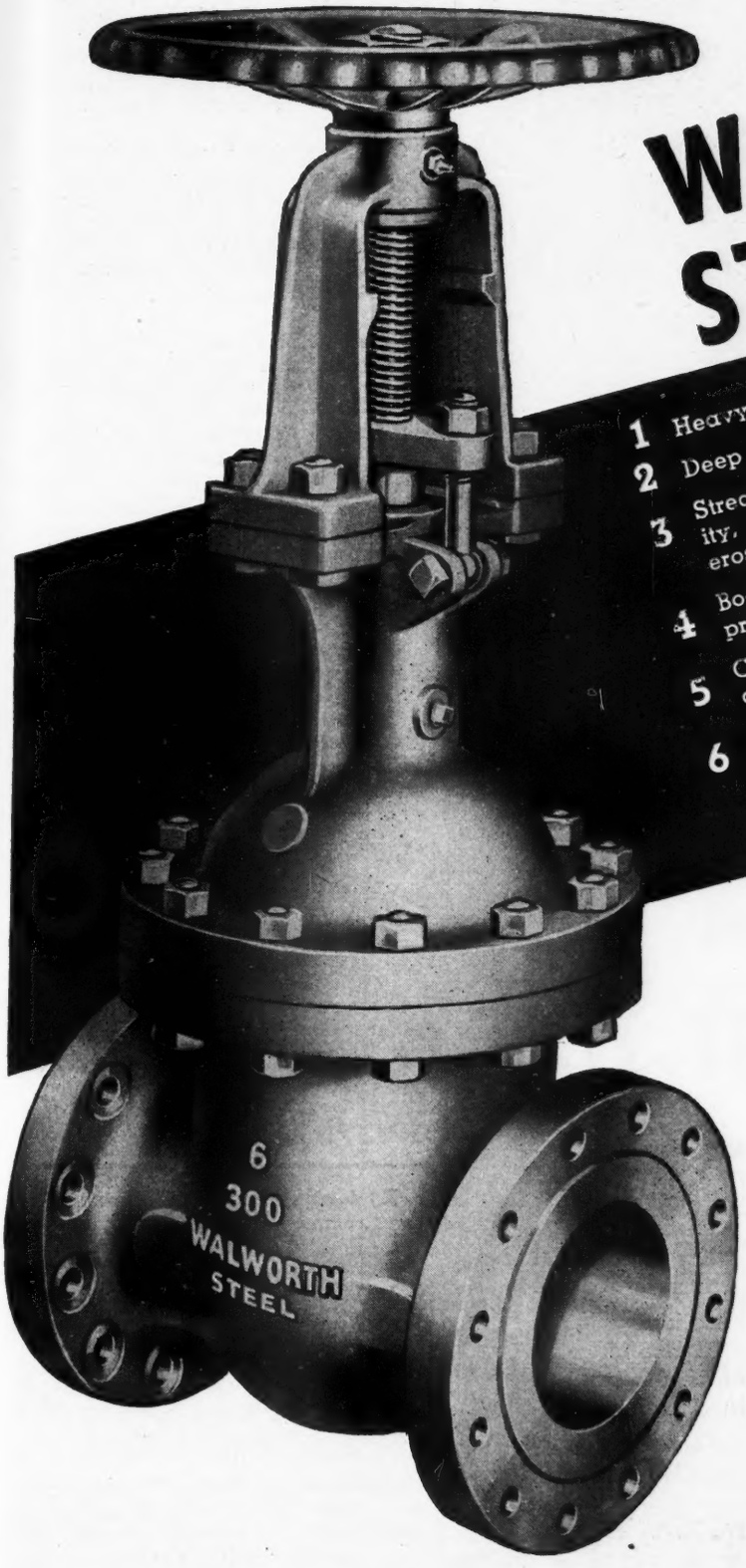
Charles J. Callan, who during the war was in direct charge of the sale and production of more than $100,000,000 worth of General Foods products for the armed forces, has retired. Succeeding Mr. Callan will be Norman Grant, who has been in charge of the company's war business in Washington.

Norman E. Cooke has been appointed research chemist of the Pacific Fisheries Experimental Station, Prince Rupert, B. C. He replaces Mrs. Betty H. McKercher, who has resigned.

William Geisler has been appointed head of the operations and engineering department of the Pepsi Cola Co., Long Island City, N. Y. In his new capacity, he will be in charge of all production, engineering, machinery and equipment problems.

Dan L. Gruber recently joined the sales organization of Basic Food Materials, Inc., Cleveland, Ohio. Mr. Gruber will cover the Chicago, Wisconsin and Michigan territory.

You get all these BIG features in WALWORTH STEEL VALVES



1. Heavy steel walls for extra strength and protection.
2. Deep stuffing boxes to eliminate costly leaks.
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4. Bodies and bonnets engineered to withstand pressure and minimize distortion.
5. Cast body guide rib faces, machined to insure accurate disc centering.
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Is there any wonder that out in the field, where approval is based on performance under actual operating conditions, industry has put its O.K. on Walworth Steel Valves?

Tough . . . wear resistant . . . dependable, these valves are produced in gate and globe types, in sizes to cover practically every service requirement. They are excellent examples of Walworth leadership . . . leadership that has made the Walworth valves famous throughout the world.

Walworth Catalog 42 gives complete information regarding Steel Valves as well as the full line of Walworth valves and fittings in bronze and iron. Your copy may be obtained upon request. Whenever you need valves — whether steel, bronze or iron — remember Walworth for dependability, economy, and long service life.

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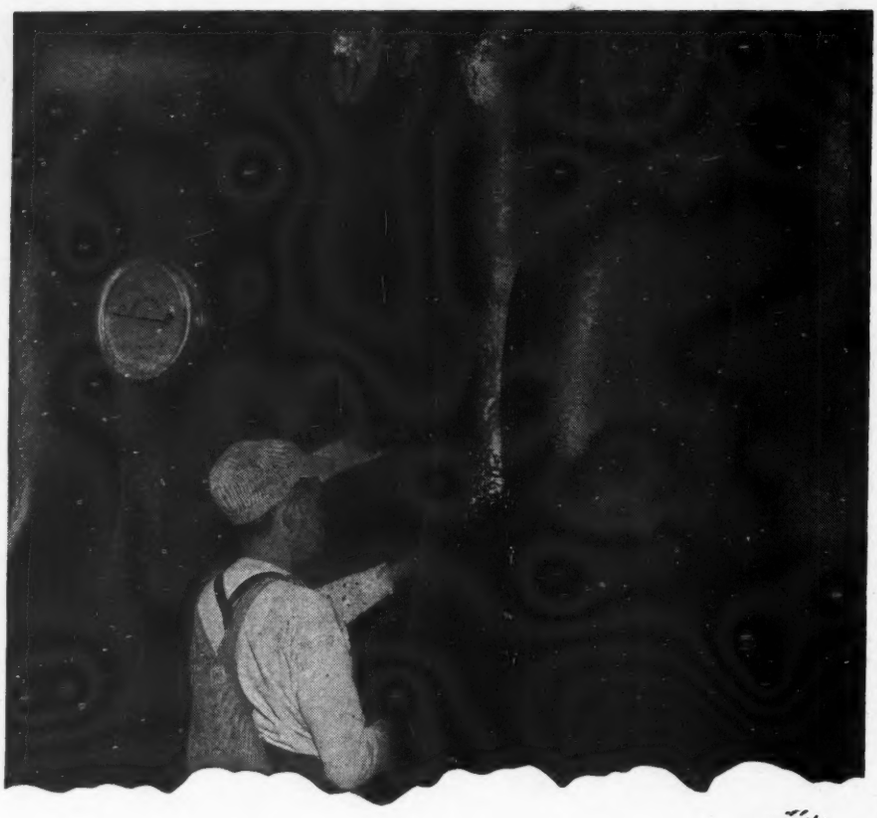

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IT HAS TO BE RIGHT THE FIRST TIME

When it comes to insulations, "nearly right" is wrong!

That's why it pays to get J-M Rock Cork . . . standard of the refrigeration industry for years!

Basically mineral in composition, Rock Cork has low thermal conductivity, plus high resistance to moisture, vermin and rot.

Remembering that insulation will only render its maximum efficiency when properly applied, Johns-Manville also offers an application service of skilled construction units. These units are organized to handle every detail of your insulation requirements from plans to finished job.

For details about Rock Cork, write for brochure DS-555, or get in touch with your J-M Insulation applicator. Johns-Manville, Box 290, New York 16, N. Y.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville ROCK CORK

Dr. H. W. E. Larson has resigned as associate chemist of the Georgia Experiment Station, Experiment, Ga., and now is with the U. S. Department of Agriculture in Boise, Idaho.

David A. Pfaelzer has joined the sales staff of Amino Food & Pharmaceutical Division of International Minerals & Chemical Corp., Chicago, according to an announcement by Dr. A. P. Hellwig, director of sales.

Otto Schnering, president of Curtiss Candy Co., Chicago, has been re-elected. W. C. Jakes, Philip B. Schnering and Robert B. Schnering were elected vice-presidents, and E. V. Zeddies and Philip J. Reddy were re-elected vice-presidents.

Frank A. Smola, at present working on his doctorate degree in administrative education at the University of Chicago, has been appointed educational director of the National Dairy Council, Chicago. Mr. Smola will assist in the development and use of educational materials of the council, and will serve as a liaison between the Dairy Council and educators, text and reference book publishers, and producers of audio-visual materials.

E. W. Stephens, formerly general manager of the South San Francisco Union Stockyards, South San Francisco, Calif., now is director of the Western office of the American Meat Institute, with headquarters in San Francisco. He succeeds E. F. Forbes, who recently resigned.

Dr. Betty Sullivan, director of research, Russell-Miller Milling Co., Minneapolis, has been elected to the board of directors of the company.

John Walker has been appointed manager of the newly created package products division of the Fisher Flouring Mills Co., Seattle.

DEATHS

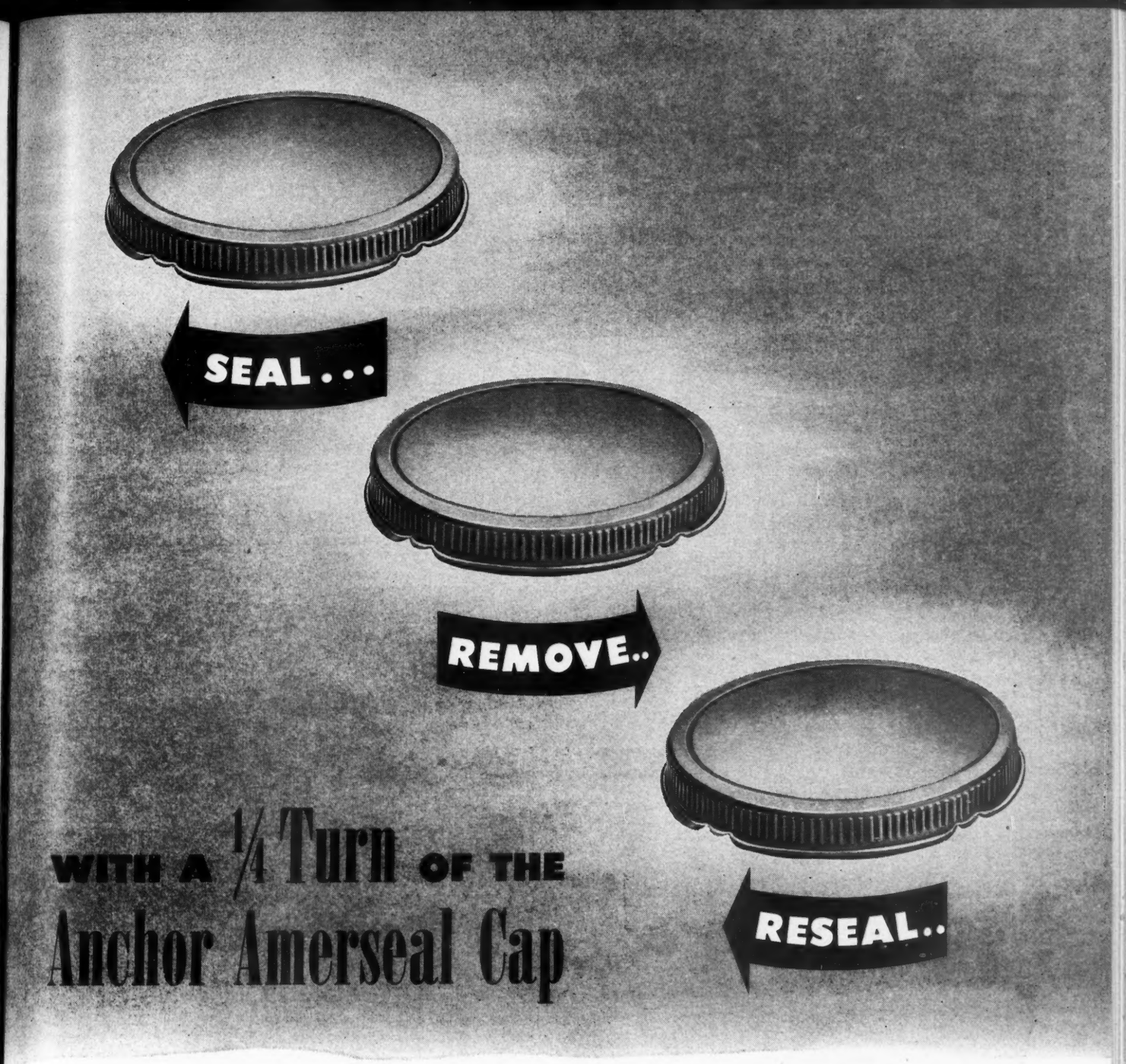
Raphael F. Davis, 76, secretary of the Creamery Package Manufacturing Co., Chicago, July 29.

D. T. Gunning, 61, former president of the American Spice Mills, Inc., August 10, at Kankakee, Ill.

B. H. Heide, 79, manager for 40 years of the International Live Stock Exposition, Chicago, August 3.

James Wilson Parks, 69, salmon canner, who established the Western Fishery Co., Cordova, Alaska, and operated the Parks Canning Co., Kodiak, recently, in Seattle.

James C. Robinson, Sr., 65, Southeastern District manager for the Emmart Food Products Co. of Chicago, recently, in Atlanta, Ga.



WITH A ¼ Turn OF THE Anchor Amerseal Cap

THE Anchor Amerseal Cap is a quick-acting, dependable closure that seals or reseals with a simple quarter turn. It speeds packaging because it may be started at any point on the container finish. And it's adaptable for hand, hand chuck or machine closing operations.

Equally spaced, double-notched lugs in the Amerseal Cap grip the underside of the glass threads and pull the liner down tightly, insuring uniform distribution of pressure all the way around the container finish.

This easy removal and reseal feature has made the Amerseal Cap the most popular closure with housewives over the years. That means she buys more packages sealed with Amerseal Caps. That means more sales, more profits for you.

Tune in "Crime Photographer" every Thursday evening, entire Coast-to-Coast Network, CBS

Anchor
CONTAINERS and CAPS

PRODUCTS OF
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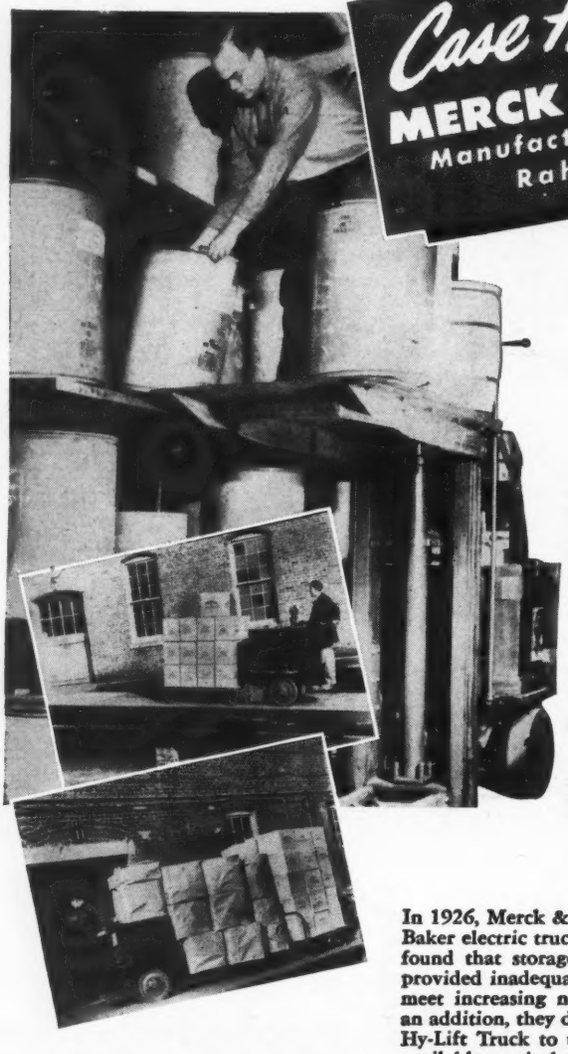
Vertical Storage with BAKER TRUCKS

more than doubled Storage Facilities



Hy-Lift Truck illustrated has oversize "safety" platform providing greater carrying space. Operator can raise or lower load by remote control from the platform.

(Inset, above) Baker Low-Lift Truck moves capacity load easily up a 10% ramp 70 feet long.

(Below) This 4000 lb. Baker Truck does double duty. Besides its own big load, it hauls a loaded trailer.

In 1926, Merck & Co., Inc. bought its first Baker electric truck. Twelve years ago they found that storage along horizontal lines provided inadequate warehousing space to meet increasing needs. Rather than build an addition, they decided to install a Baker Hy-Lift Truck to tier material, thus using available vertical storage space. So successful was this truck—not only in providing more storage capacity but also in speeding material movement—that more and more were installed, until today the Company operates a fleet of 18 Baker Trucks: Eleven Hy-Lift Trucks, two Low-Lift Trucks, two Fork Trucks, and three Platform Trucks. Besides obviating the need for new building by increasing existing storage facilities, these trucks are conserving time and manpower on handling operations throughout the plant.

A Baker Material Handling Engineer can help you make similar savings. Write for information.

BAKER INDUSTRIAL TRUCK DIVISION *of the Baker-Raulang Company*
2146 West 25th Street • Cleveland 13, Ohio
In Canada: Railway & Power Engineering Corporation, Ltd.

Baker INDUSTRIAL TRUCKS

John W. Taylor, 80, founder and president of the John W. Taylor Packing Co., Hallwood, Va., July 2.

Benjamin Weil, 98, one of the founders of the Weil Packing Co., Evansville, Ind., August 5.

T. Blair Willison, 68, executive vice-president, general manager and treasurer, Clover Farm Stores Corp., Cleveland, July 25.

ASSOCIATED INDUSTRIES

Island Equipment Corp., New York, has made known the appointment of Albert S. Tomlinson as head of the new bakery conveyor table division.

Arthur D. Little, Inc., Cambridge, Mass., industrial research organization, has announced the appointments of Daniel R. Weedon, Jr., packaging specialist; Dr. Colin C. Reid, organic chemist; Dr. George P. Fulton, biologist and Garvin Bawden, Jr., Market analyst.

Orley Freezers, Inc., announces the appointment of Chas. W. Stillman as executive vice-president. A veteran of more than 20 years in the frozen food field, Mr. Stillman formerly was with the Coldaire Corp.

Robins Conveyors, Inc., Passaic, N. J., manufacturer of materials handling machinery, announces that its Philadelphia office will be consolidated with that of its parent organization, Hewitt-Robins, Inc., Philadelphia.

Sterling Electric Motors, Inc., Los Angeles, plans a large betterment and improvement program for its manufacturing facilities. The company is expending $600,000 in modernization and new buildings.

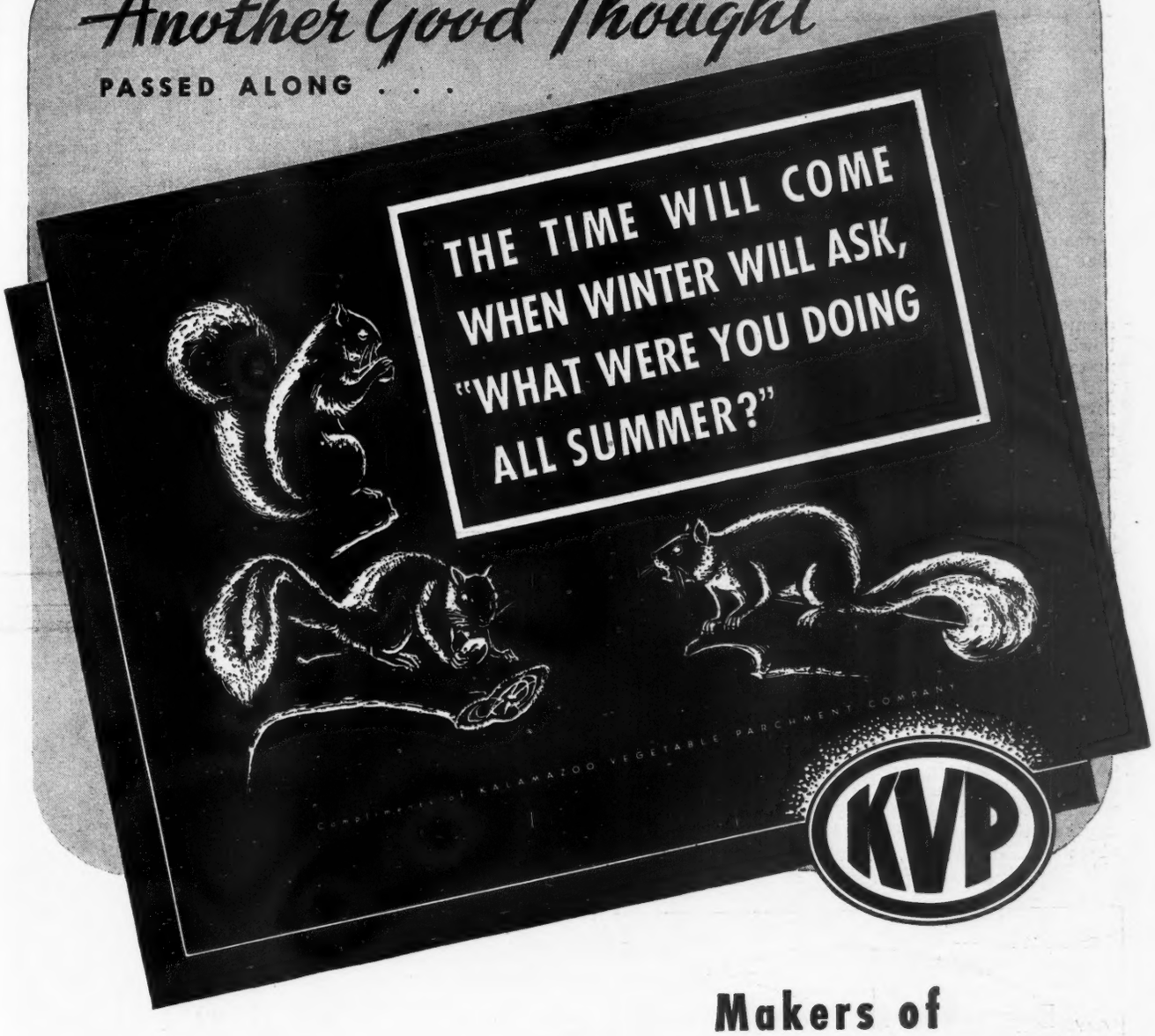
Triangle Package Machinery Co., Chicago, has appointed Kilroy Co., Pittsburgh, as its sales representative. James Johnston, of Kilroy, will be in charge of sales of Triangle weighers, fillers, auger packers and carton sealers in western Pennsylvania, western New York, eastern Ohio, West Virginia and Virginia.

Winthrop Chemical Co., Inc., New York, has elected Val Kolb, divisional vice-president in charge of the special markets division. The special markets division is engaged in the marketing of vitamins, chemicals and the new flour bleaching agent known as Oxylite.

York Corp., York, Pa., has appointed the Hawaiian Tuna Packers, Inc., as its distributor for Hawaii. Allan S. Davis is president of the Hawaiian company and Frank D. Ross will be in charge of the refrigeration section.

Another Good Thought

PASSED ALONG . . .



Makers of
Food Protection Papers

★

GENUINE VEGETABLE PARCHMENT
SPECIAL TREATED . .
GREASEPROOF . .
WAXED . .

"THE WORLD'S MODEL PAPER MILL"

KALAMAZOO VEGETABLE
PARCHMENT COMPANY

. . .

PARCHMENT . KALAMAZOO 99 . MICH.

BRANCH PLANTS IN HOUSTON, TEXAS
AND PHILADELPHIA, PENNSYLVANIA

FOOD EQUIPMENT NEWS

Centrifugal Reducer

"VERSATOR," a machine that reduces centrifugally any flowable material—from the most fluid to the most viscous—to a micro- or mono-particle film without the application of mechanical pressure and without any temperature rise, is announced by the Cornell Machine Co., Dept. I, 101 Park Ave., New York 17.

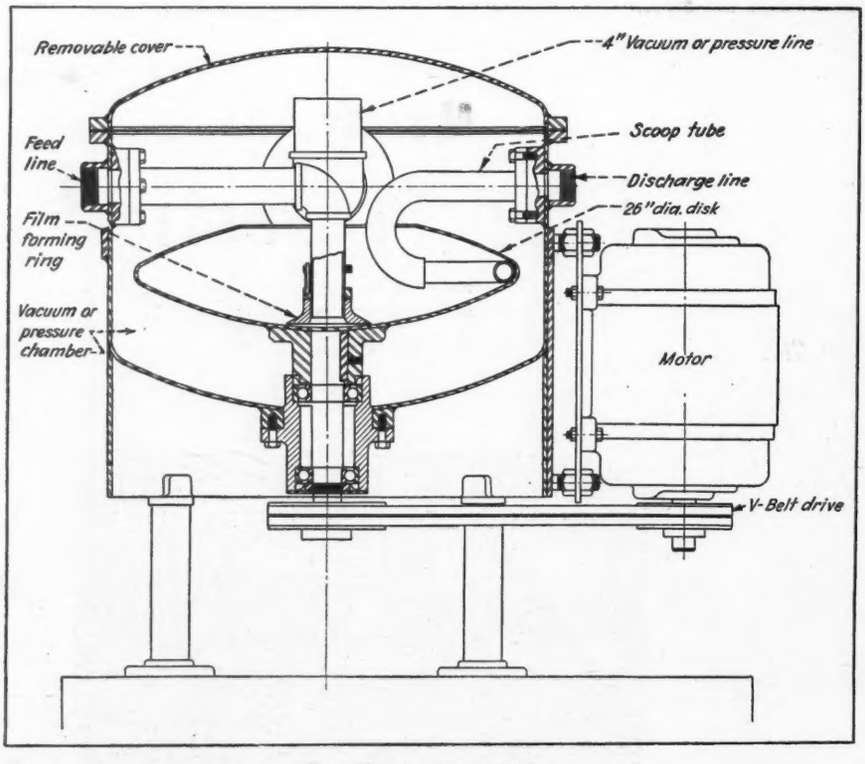
The unit consists of a vacuum or pressure chamber in which a 26-in. diameter disk in the form of an open bowl operates at high speed. As the material being processed is fed onto the center of the spinning disk in the form of an exceedingly thin film, centrifugal force makes it flow out radially in ever-widening spirals that reach minimum thicknesses and maximum velocity at the perimeter of the disk. The slope and speed of the disk produce a highly turbulent film that becomes virtually "all surface." This is an ideal state for the application of vacuum or pressure, heat or cold, diffusional processes or irradiation.

The "Versator" can be used for homogenizing, emulsifying, reversing emulsions, dispersing solids in liquid vehicles, de-gassing or deaerating solutions. It can also be used for evaporating, dehydrating or distilling extremely heat-sensitive materials without thermal decomposition, for impregnation, wetting, or hydration of fibres or solid particles, for oxidations or continuous hydrogenations, and many other operations.

Through-put capacities range from 10 to 100 g.p.m. Power consumption is less than 7½ hp. for viscosities no greater than those of heavy lubricating oils and somewhat higher for really viscous materials. Disk speeds may be as low as 900 r.p.m. but the optimum speed for most operations is about 1,800 r.p.m. The unit is available in steel, stainless steel, nickel, monel metal, Everdur, and other metals. It can be rented for a full year for either experimental or production runs.

Swivel Pipe Coupling

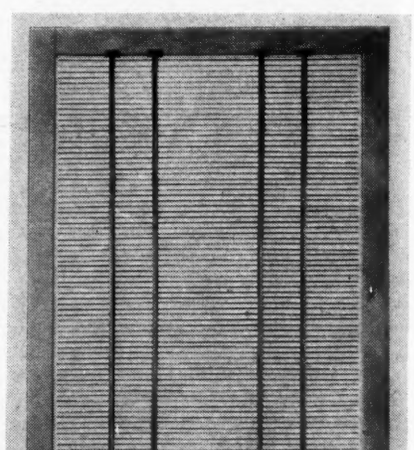
TRANSMISSION of fluids under high pressure through a pipe which swivels or rotates through a full 360 deg. is possible with the new All-Flex ball-bearing swivel pipe coupling. This development of Snyder Sales Corp., Dept. I, 5225 Wilshire Blvd., Los Angeles 36, Calif., employs a combination of multiple synthetic packings and metallic seals which is said to assure absolute freedom from leakage at both high and low pressures. A double row of ball bearings, plus metal-backed packings, is said to give lowest possible resistance to rotation, permitting ease of operation at all pressures. Available sizes range from ⅛ to 1 in. normal tube size, with a variety of threaded and elbow connections to meet particular needs.



Centrifugal micro reducer.

Electric Fly Screen

AN ELECTRIC fly screen, consisting of two sets of sturdy bars spaced three-eighths of an inch apart, supported in a metal frame and constructed of rust-resisting material, is announced by Detjen Corp., Dept. I, 303 West 42nd St., New York, N. Y. They are available in standard sizes for windows or doors and can also be manufactured to order. The bars are energized by a new type transformer operating at 10 milliamperes. The electrical field set up between the two sets of bars presents an electrical barrier, which no fly or other flying insects can pass alive. As they attempt to fly through, the moisture in their bodies causes the electric current to complete a circuit from one bar to the other. The equipment is safe for human beings and animals.



Electric fly screen.

This equipment is recommended for buildings wherever food is handled. They operate automatically and continuously. Each screen is said to use about ten cents worth of electric current per month.

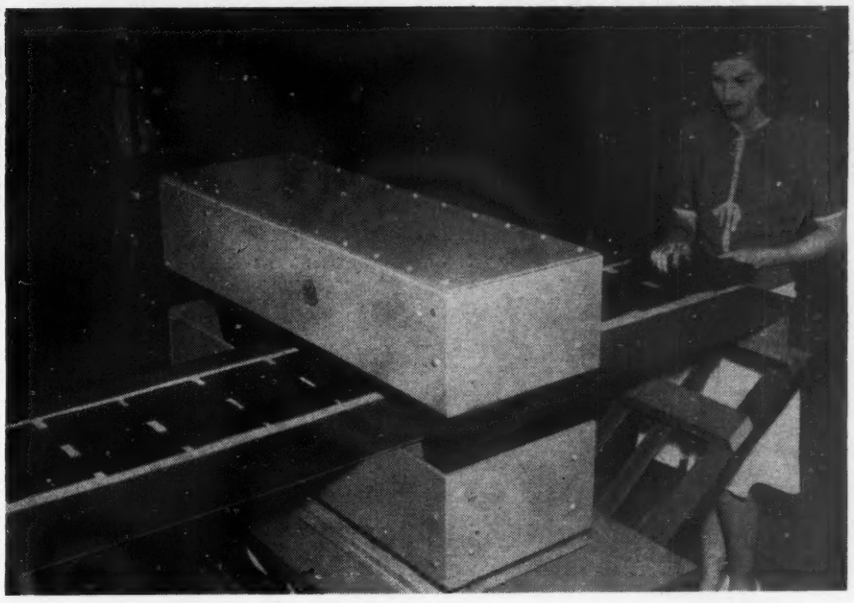
Aluminum Stepladder

WEIGHING only 16 lb. in the 5 ft. size, a line of aluminum folding stepladders is available in sizes of 4, 5, and 6 ft. from Aluminum Ladder Co., Dept. I, Worthington, Pa. The ladder is constructed entirely from aluminum alloy 52S, which has a tensile strength of 37,000 lb. per sq. in. Non-skid treads are provided for safety. Great strength is said to be combined with exceptionally light weight.

Electronic Metal Detector

THE ELECTRONIC metal detector is a scientifically designed automatic inspection device for the detection of metal particles of any kind in non-metallic materials such as foods. Radio Corporation of America, Dept. I, Camden, N. J. states that the product being inspected is conveyed by belt or other means through the inspection aperture of the equipment, where it is screened by a high frequency electro-magnetic field formed by coils embedded in plastic panels at the top and bottom of the aperture. If metal is present, it causes a reaction that is detected and amplified by a sensitive electron tube amplifier, which triggers a signaling device. This may be a bell or lamp, an automatic ejection or marking device, or a combination thereof, whichever is desired. All metals are detected and rejected by this process including iron, tin, copper, aluminum, lead, brass and stainless steel.

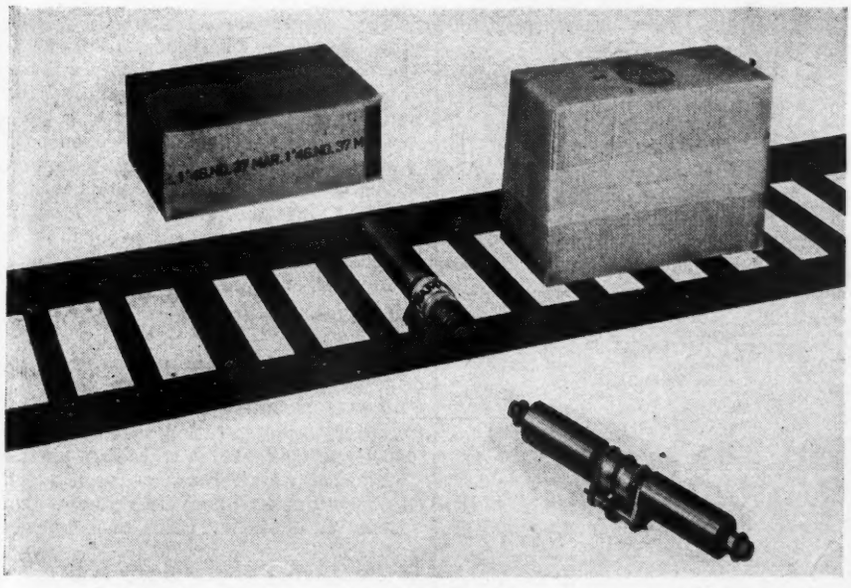
It accommodates conveyor speeds up to 600 ft. per minute without impairment of inspection efficiency. It is dust tight, splash-proof and this construction permits scrubbing and hosing where required.



Electronic metal detector.

Case Marking Attachment

"ROLACODER 50" is a marking attachment for placing a continuous impression on the bottom of a case or crate as it travels along a roller conveyor. The manufacturer, Adolph Gottscho, Inc., Dept. I, 1 Hudson St., New York 13, supplies a complete self-inking assembly, which is all that is necessary to imprint products automatically. The Rolacoder is installed in a roller conveyor in place of one of the standard rollers. The type cylinder carries a channel or slot into which the interchangeable rubber type is inserted. Inking is by two solid felt ink rollers in contact with the type. Code or marks will repeat approximately every six inches. For cases less than six inches the information may be inserted twice in the die wheel. The unit is made with tow-inch diameter rolls. For those roller conveyors that require smaller diameters, it is mounted below the center line of the rest of the rollers so that the top surfaces are in line.

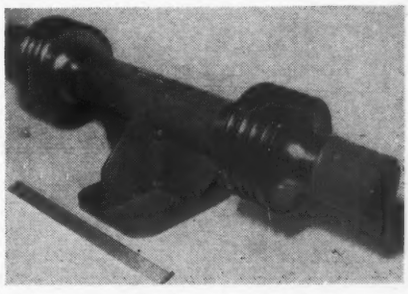


Automatic case-marking attachment.

Expansion Joints

PACKLESS expansion joints that combine rigid anchoring of piping at accessible points, with allowance for an equal thermal expansion and contraction on either side of the anchor point, due to differences in pipe length, and in temperature and exposure, are announced by the Magnilastic Division of Cook Electric Co., Dept. I, 2700 North Southport Ave., Chicago 14, Ill. Where severe hydraulic surges within piping occur, these joints minimize the transmission of shock to fittings and adjacent structures.

"Magnilastic" joints are made for standard pipe sizes from ¼ in. to 24 in. The expansion flanges are supplied from any one of the standard 25-lb.,

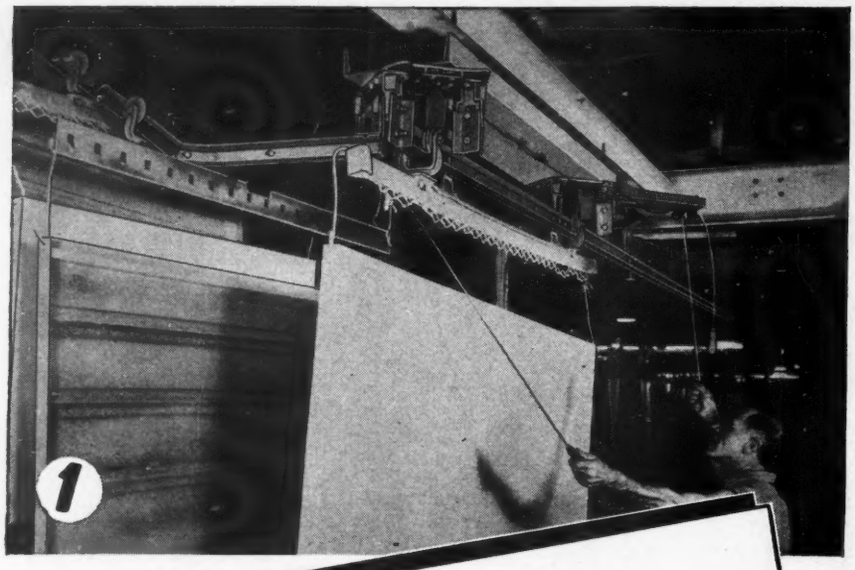


Packless expansion joint.

55-lb., 150-lb., 400-lb., or 1,000-lb. series to accommodate all pressures from vacuum to 1,000 lb. per sq. in. Joints of stainless steel, Monel, Inconel and copper cover all commonly met corrosive conditions. Temperatures handled range from -300 deg. F. to 1,600 deg. F. A variety of standard fittings, such as elbows, tees, ells and Y's, can be incorporated into anchor joints to make a single, compact, accessible unit. Welding ends, as shown in the accompanying illustration, are regularly supplied with pipe flanges and inner lining optional.

Internal Bucket Elevator

LOOP-TYPE, internally loaded bucket elevator, particularly suited to handle delicate materials of relatively small size, is announced by Link-Belt Co., Dept. I, 307 N. Michigan Ave., Chicago, Ill. It provides a means for elevating without damaging either in transit or during feeding or discharging articles or materials that cannot be safely handled by conventional elevating equipment.



AMERICAN MONORAIL *System* Uses Power for SPOT Handling

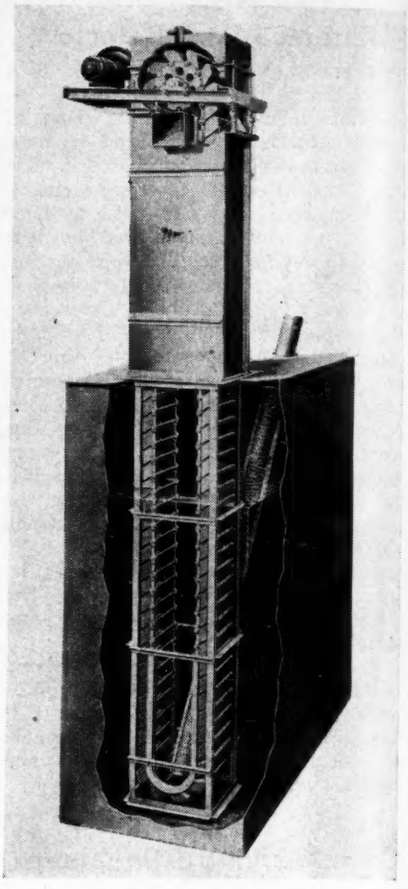
Extreme flexibility of movement is carefully maintained in this hand operated American MonoRail System. Where quick change of trolley travel or passage of carrier through process is required, power driven equipment takes care of such spots as . . .

1. Crosstrack switches provide 90° transfer to shipping area as carriers roll off power conveyor in finishing oven.
2. Empty carriers raised to high level track for gravity return to loading station.

American MonoRail Engineers, with their wide experience in solving difficult handling problems, will gladly consult with you. Send for Bulletin C-1 illustrating hundreds of similar operations.

THE AMERICAN MONORAIL COMPANY

13125 ATHENS AVE. ● CLEVELAND 7, OHIO



Internally loaded bucket elevator.

The elevating medium consists of an endless series of overlapping, inwardly-opening continuous buckets, supported on the pins of a wide, power-operated strand of "SS" type steel roller chain. This is operated slowly over sprocket wheels at top of lift, and at foot is guided by curved steel angle tracks. There are no foot sprocket wheels. The buckets open only in the back, and are closed at bottom, top and front. This permits internal loading at foot from a chute extending directly through the broad side of the steel casing, which incloses the elevator. The material flows directly into the open backs of the buckets and there is no danger of pinching or leakage.

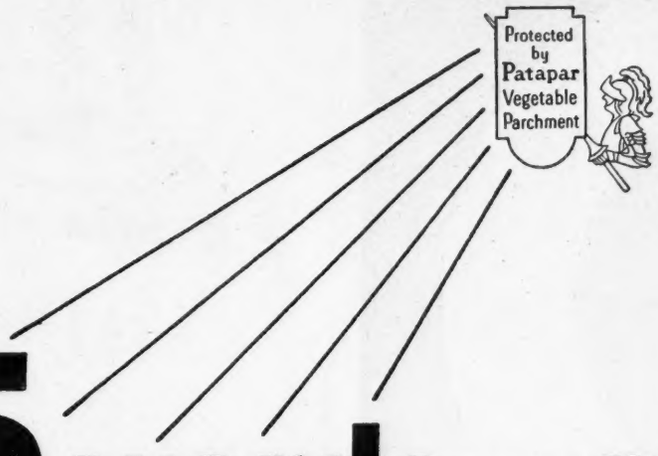
The elevator can be loaded on both sides, either by chute or conveyor extending directly over the bucket line at foot, and it can be discharged at the top to either side, through a rubber-lined chute or directly to a conveyor extending under the bucket line.

Pneumatic Atomizing Nozzle

SIMPLIFICATION of installation and trouble-free operation are the two outstanding features of the pneumatic atomizing nozzle that has been added to their line by Spraying Systems Co., Dept. I, 4061 W. Lake St., Chicago 24, Ill.

Installation of the nozzle consists of removing the flange from the nozzle

The Patapar *Keymark*



5 words...*millions have read them*

"Protected by Patapar* Vegetable Parchment"

The Patapar Keymark is nationally advertised. Millions of women have seen it in magazines. And when they see it on food wrappers, they know the product inside is well protected... because Patapar has high wet-strength, resists grease, and is pure in texture.

If you use printed Patapar we'll include the Keymark on your printed wrappers . . . at no extra cost to you. It's a way you can impress customers that your product is well protected.

The printing of Patapar is done in our own plants. Here we have complete modern equipment for printing Patapar in one color or several colors – by letterpress or offset lithography. We handle every detail.

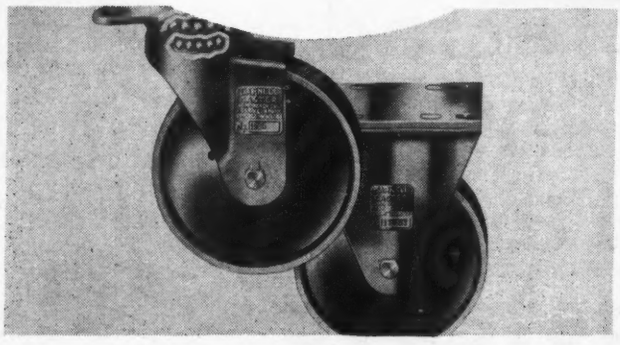
*Reg. U. S. Pat. Off.

Paterson Parchment Paper Company • Bristol, Pennsylvania

Headquarters for Vegetable Parchment Since 1885

WEST COAST PLANT: 340 BRYANT STREET, SAN FRANCISCO 7, CALIFORNIA
BRANCH OFFICES: 120 BROADWAY, NEW YORK 5, N. Y. • 111 WEST WASHINGTON ST., CHICAGO 2, ILL.

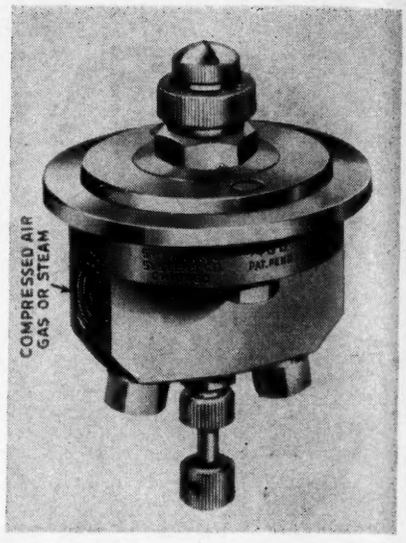
A SAVING AT EVERY TURN



DARNELL CASTERS

All Darnell Swivel Casters feature a DOUBLE BALL-BEARING SWIVEL HEAD —assuring the easiest handling of the heaviest loads on any type floor.

DARNELL CORP. LTD. 60 WALKER ST., NEW YORK 13, N.Y.
LONG BEACH 4, CALIFORNIA 36 N. CLINTON, CHICAGO 6, ILL.



Pneumatic atomizing nozzle.

and mounting the flange on equipment where required. After the flange is positioned, the nozzle is bolted to the flange. Clogging of the nozzle orifice is prevented by the fine mesh monel metal screen in the nozzle body. Screens are removable for easy cleaning.

Nozzles are available in either white plated brass or stainless steel. Regardless of the nozzle body and core material, the shut-off needle is always stainless steel.

Nozzles of this type atomize liquid pneumatically by means of either air, gas or steam pressure. Water, oil, and liquids with similar viscosities may be sprayed.

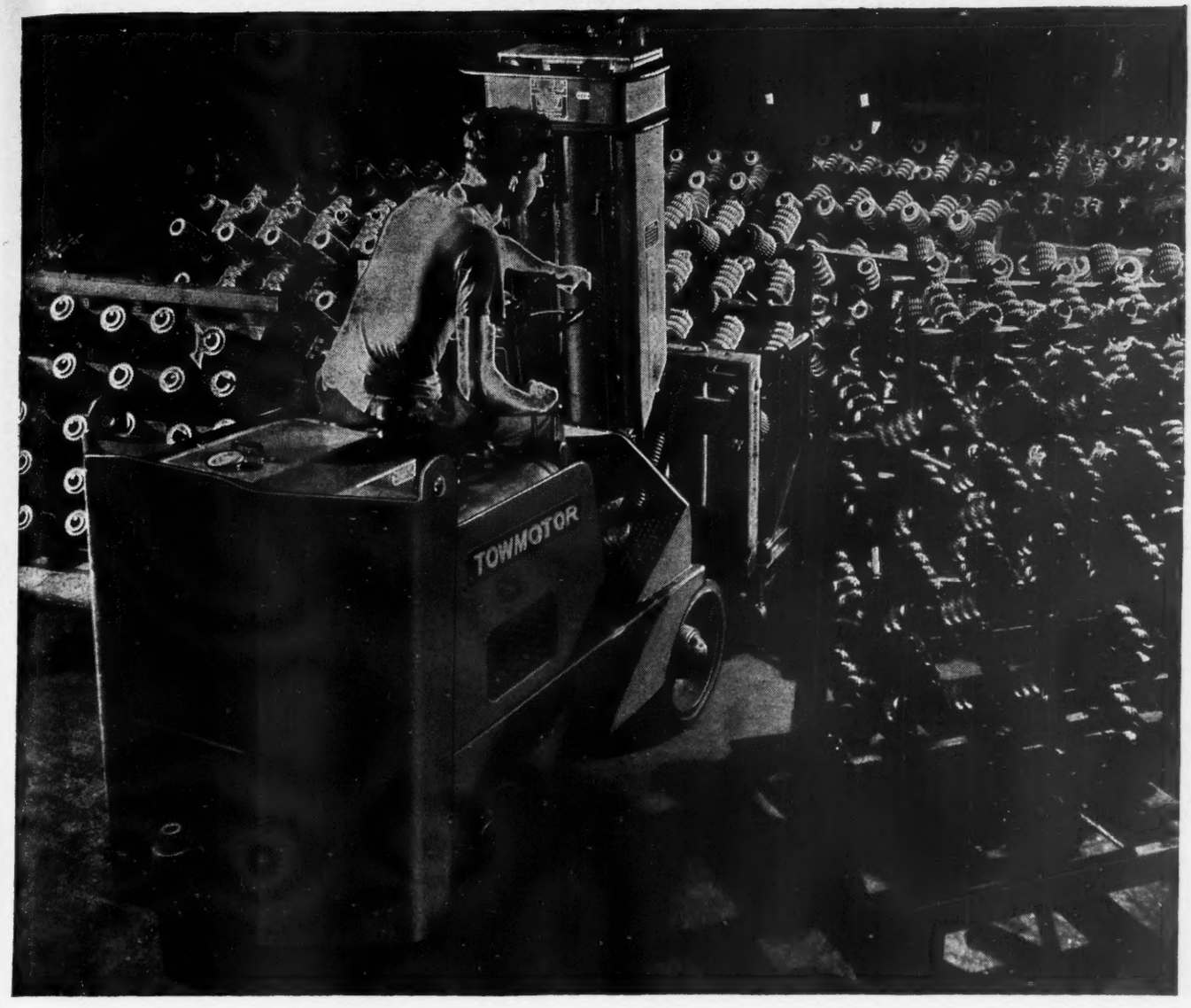
Portable Conveyor

A PORTABLE conveyor that is rust-proof and dust-proof is announced by E. W. Buschman Co., Dept. I, Cincinnati 22, Ohio. The wheel treads and hubs of the wheels are protected with a heavy zinc plate. Side discs of the wheels are red baked enamel and a special inner seal excludes water, dust, grit and other harmful foreign material from the full ball bearing, insuring smooth operation as well as preventing corrosion due to out-of-door uses.

Ten-foot and 5-foot lengths are available as well as 90, 60, 45 and 30 deg. curves, with an inside radius of 2 ft. 6 in. Curves are reversible and are supplied with guard rails on the outside and adjustable center leg supports. The weight of the conveyor is approximately 7 to 8 lb. per ft.

Rotary Heat Sealer

To answer the demand for a double-drive, low-priced rotary heat sealer for bags, pouches, etc., Pack-Rite Machines, Dept. I, 714 W. Wisconsin Ave., Milwaukee, Wis., announces the development of their "Fast-Tite" model. Thermostatically controlled to seal a wide range of heat sealing



GEARED—TO CAPACITY PRODUCTION

MILLIONS OF GEARS—gears of many sizes and shapes, for a large variety of uses—are produced by Warner Gear Division, Borg-Warner Corporation. Mass production of this sort entails numerous handling problems, many of which are effectively solved by a fleet of eleven Towmotors.

On receiving docks, a single Towmotor handles all types of raw materials including 18-foot bar stock, keeps materials flowing to production departments. In the shop, Towmotors tier 5600-lb. loads three high to triple storage space, provide a simple answer to the perplexing problem of transporting 1200-lb. cyanide pots from heat-treating to storage. One unit often does the work of a ten-man gang.

In the shipping department, two Towmotors load 250,000 lbs. of gears daily, in addition to supplying loads for three interplant trucks. And to Towmotor's record for versatility and capacity can be added economical operation . . . operating costs for each unit total only one-quarter of the operator's wage.

For every handling problem, however unusual, there is an engineered solution . . . a solution based on Towmotor experience and "know-how" gained in solving handling problems in every industry. Send for your copy of the Towmotor Lift Truck ANALYSIS GUIDE. Towmotor Corporation, 1222 East 152nd Street, Cleveland 10, Ohio.

TAKE IT UP WITH

TOWMOTOR

THE ONE-MAN-GANG

"You CAN take it with you"

if it's a

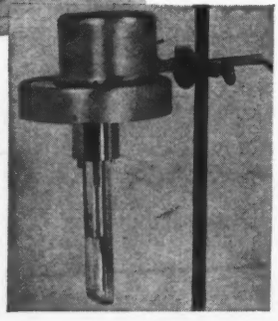
BROOKFIELD
SYNCHRO-LECTRIC
VISCOSIMETER

Making Viscosity tests at point of process is a snap with the Brookfield Viscosimeter. All you need is a convenient electrical outlet and you're set to take readings of high accuracy in 30 seconds.

Readings given directly in centipoises over wide ranges. Temperatures up to 600° F. No adjustments necessary. Requires no technical skill.

PORTABLE!
USE IN PLANT OR LAB

Same instrument can be used in both plant and lab Use as a portable instrument shown at left Operates on 60 cycle 110 volt current



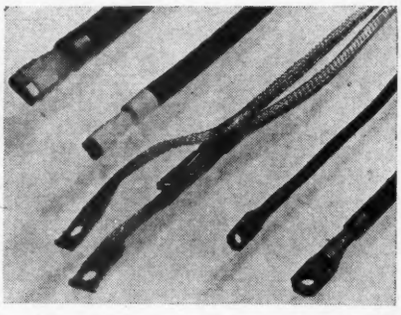
When instrument is needed for stationary use only it may be mounted on a rod clamp as shown at right. Handles are interchangeable.

BROOKFIELD
ENGINEERING LABORATORIES
BOX 603-F, SHARON, MASS.

materials, it can be operated horizontally, vertically or at an angle and can seal any length bag, pouch, or barrier. It will seal up to 300 or more lineal inches per minute, depending on the material being sealed. No carbon points or brushes are used. Wiring is directly to stationary ring heating units under transite plates covering both sealing rollers.

Insulation

A SPECIALLY formulated plastic, which can be shrunk at room temperature around connectors, cable ends, busbars, tools and other pieces of electrical equipment to form tough, durable insulation, is announced by the General Electric Co., Dept. I, Pittsfield, Mass. It is available in form of caps, sleeving and tubing. It possesses



Vinyl plastic sleeves.

excellent heat resistance and is unaffected by common solvents and acids. These products are available in a variety of colors.

Previous to use, caps, sleeves and tubings are soaked in a special G-E dilator solution in which they swell to half again their normal size. While dilated, they are slipped over the part and allowed to dry thoroughly. They shrink to smaller than their original size to form a tight covering over the exposed surface. All products are shipped dry and can be stored in or out of the dilator indefinitely.

Pre-Collector

WHERE contaminated air that is cleaned by a dust collection system contains materials having a recovery value, or abrasive particles, the new Velocitrap announced by Claude H. Schneible Co., Dept. I, 2827 25th St., Detroit 16, Mich., is useful as a precollector. The device salvages valuable materials in a dry state for return to the process and greatly reduces abrasive wear in the duct system and collectors, also eliminating the settling out of materials in the ducts.

The Velocitrap is placed in the intake duct ahead of the collector and employs slot-shaped openings in an elbow of the duct to separate the larger solid particles by centrifugal force, depositing them in a hopper. Hence only a minimum of the smaller

Economize WITH POWERS

TEMPERATURE REGULATORS

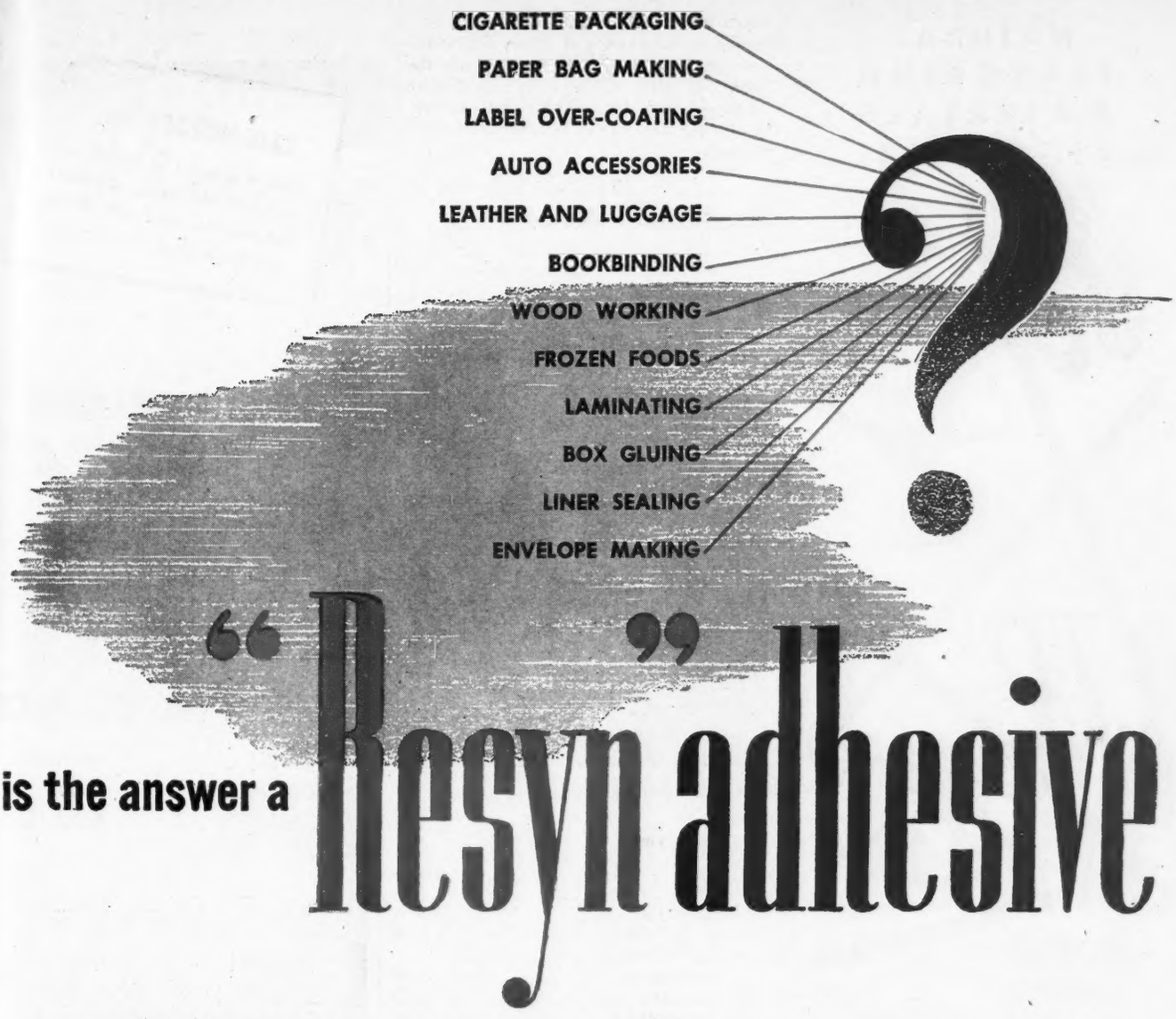
Use a Powers No. 11 Temperature Indicating Regulator when you want the advantages of an easy-to-read dial thermometer combined with a dependable self-operating regulator. The dial thermometer gives a visual check on the performance of the regulator and makes it easy to adjust for the required operating temperature. Various dials and ranges are available.

Is Easy To Install—because both the thermometer and the regulator operate from the same thermal system—only one tapped opening is required.

Write for Circular 2511

THE POWERS REGULATOR CO.
2799 Greenview Avenue, Chicago 14, Illinois
231 E. 46th St., New York 17, N. Y.—Offices In 47 Cities . . . See your phone directory.
70

OVER 50 YEARS
OF AUTOMATIC TEMPERATURE AND HUMIDITY CONTROL



"?" is the answer a Resyn adhesive

Each "RESYN" Adhesive is a complex blend that is designed to do a specific job exceedingly well. Many amazing developments have resulted from applying them to packaging, converting and assembling operations previously thought to be at their highest level of efficiency.

Why? Because "RESYN" adhesives provide higher resistance against all forms of moisture and temperature variations. They're vermin-proof, mould-proof, age-proof. They're economical. They increase production speeds, reduce supervision, offer greater versatility, spread and penetrate uniformly, and bring increased sales advantages to many products.

What are some uses? *In bag making:* for difficult stocks . . . breather action . . . moisture vapor barrier. *In luggage making:* for softness and pliability . . . resistance to fungus . . . laminating before shaping under heat and pressure. *In chemical packaging:* for all-purpose, all-weather labeling and overcoating on wood, fiber, painted steel, tin and glass. *In upholstering:* for adhering cloth to cloth, chipboard, wood, metal, wadding, etc.

A whole new world of uses is opening up for "RESYN" adhesives. They're readily available. So get acquainted with their types, properties, uses. All are quickly summed up by National Adhesive in an interesting booklet: When and How to Use "RESYN" Adhesives. Write for your copy — NOW!

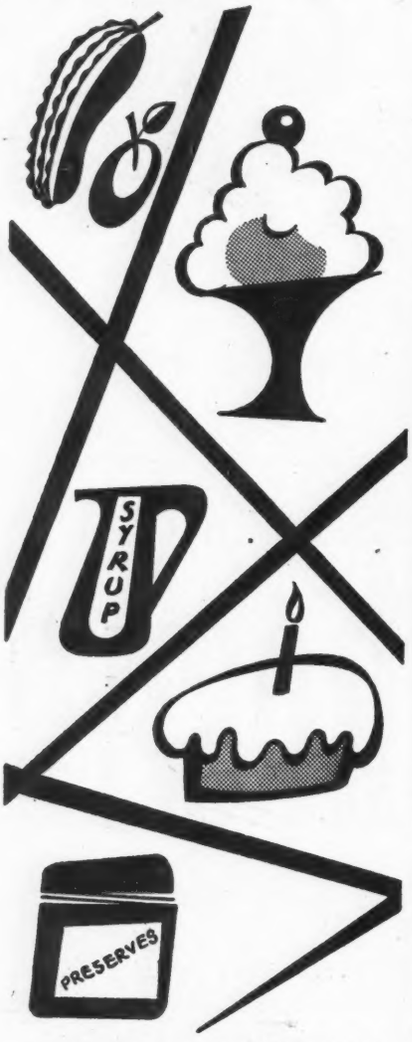
Dunellen Plant

Offices: 270 Madison Avenue, New York 16; 3641 So. Washtenaw Avenue, Chicago 32; 735 Battery Street, San Francisco 11, and in other principal cities. In Canada: Meredith, Simmons & Co., Ltd., Toronto. In England: National Adhesives, Ltd., Slough.

National ADHESIVES

EVERY TYPE OF ADHESIVE FOR EVERY INDUSTRIAL USE

NATURAL
FLAVORING
MATERIALS
SINCE 1921



TRUE FRUIT CONCENTRATES
ESSENTIAL OILS
VANILLA CONCENTRATES
OLEO RESINS
TERPENELESS OILS

You'll want these pure, wholesome flavors for all your quality products . . . syrups, relishes, preserves, jelly powders, confectionery, ice cream, beverages, cake products and fondants. DREYER imitation and pure flavors are concentrated, possessing great strength and carrying power. Economical, too, a small quantity produces a delectable flavor.

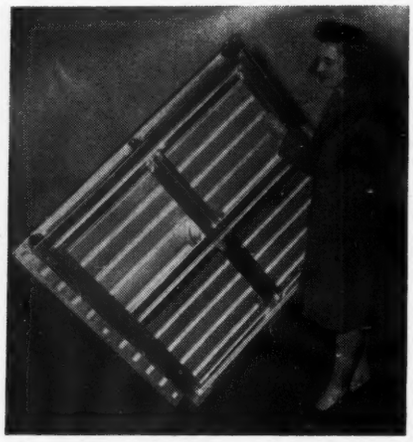
SEND FOR SAMPLES AND CATALOG C
on your company letterhead

P. R. DREYER, INC.
1191 West 19th St. • New York 11, N.Y.

solids reach the dust collector. The device is made in four types for various operating conditions and in a wide range of sizes from 2,000 to 20,000 c.f.m. It may be used in conjunction with any dry or wet dust collection system.

Aluminum Pallets

ALUMINUM pallets, weighing only one-third as much as ordinary palets, are announced by Reynolds Metals Co., Inc., Dept. I, Louisville 1, Ky. While the aluminum pallets cost about six times that of a wood unit, the saving



Aluminum pallets, showing construction.

in freight, due to lighter weight is estimated to pay for the difference in a little over two years, based on 13 round trips per year.

They are so designed as to permit truck forks to enter from any one of four sides or any of the four corners. This means that a pallet can be set down from one direction and picked up from another, affording added flexibility in storing and removing.

These pallets are made from high-strength aluminum alloys and will withstand loads up to 26,000 lb. The rigid welded one-piece lower deck is securely riveted to the upper deck through tubular load-carrying members.

Dry Chemical Extinguisher

"ALL-OUT" is the name of a new dry chemical extinguisher which utilizes gas pressure for discharge of its flat stream of dry chemical extinguishing compound. It is manufactured by Pressurelube, Inc., All-Out Fire Extinguisher Division, Dept. I, 609 West 134th St., New York 31, N. Y. The extinguisher meets the requirements of Associated Factory Mutual Laboratories and Underwriters Laboratories. It is said to perform effectively under all climatic conditions, in extreme temperatures, and in the presence of winds or drafts. Instantly forming a dense, fire-smothering cloud over a flaming area up to a distance of 18 ft., the chemical cloud is said to create an insulating barrier between the

CASE HISTORY No. 8

One in a series of factual experiences of a group of American manufacturers with Multiwall Paper Bags.

COST COMPARISON
(Per Ton)

	Burlap Bags	Paper Bags
Container cost	$3.25	$2.80
Labor cost	.71½	.18½
Total bag and labor cost	$3.96½	$2.98½
Saving, paper over fabric		$0.98

CLASS OF PRODUCT PACKED

CEMENT	FERTILIZER
CHEMICALS ✔	FOOD
FEEDSTUFFS	MISCELLANEOUS

PRODUCT CHARACTERISTICS

ABRASIVE	GRANULAR
CORROSIVE	HEAVY
DELIQUESCENT	HYGROSCOPIC
FLUFFY	LIGHT ✔
FREE-FLOWING ✔	VISCOUS

ST. REGIS BAG PACKAGING SYSTEMS are made in a variety of capacities, speeds, and manpower requirements to suit specific products and plant layouts. Machines are available in types to meet the special characteristics of a wide range of products, with filling speeds as high as twenty-four 100-lb. bags per minute — with one operator.

SOME "EARTHY" FACTS

...about Packaging Economy

Fuller's Earth a "Natural" for St. Regis Packaging System: —
....Container Costs Cut...14%
....Labor Costs Cut.....75%
....Production Potential "Upped".....180%

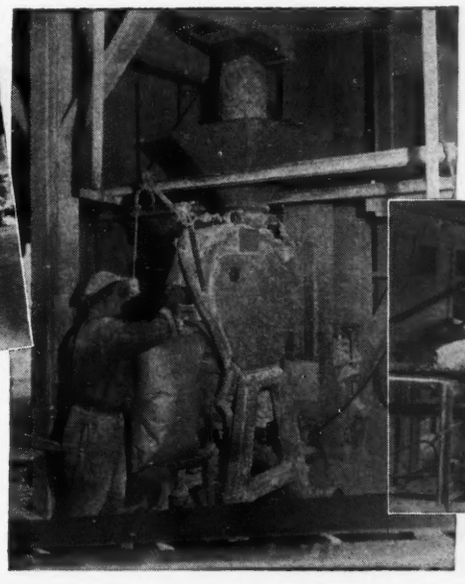
Whether you are packaging chemicals, foods, fertilizer or rock products, a St. Regis Packaging System individually designed to suit your product will effect worth-while economies. This eighth in a series of Multiwall success stories relates the experiences of the Floridin Company, Warren, Pa., processors of fuller's earth under the trade names of Floridin and Florex.

In 1945 this company installed a St. Regis 301-FB packer and began using 50-lb. Multiwall paper valve bags instead of 125-lb. burlap bags. Not only was there a saving of 45¢ per ton in container cost after switching to Multiwalls but there was also an appreciable reduction in labor costs.

Under the old system eleven men were required to package 100 tons per day in 125-lb. burlap bags. With the St. Regis Packaging System, labor costs dropped from 71½¢ per ton to 18½¢ . . . a saving of 75%. Company officials estimate that with a battery of four St. Regis packers and a crew of only eight men they will be able to increase production to 280 tons per day . . . *an increase of 180%*.

For the full picture story on how the Floridin Company reduced container costs, increased production potential, and cut labor costs by the installation of a St. Regis Packaging System and streamlined mechanized handling equipment, mail the coupon. You will find the same basic principles applicable to *your* business.

The filled Multiwalls are dropped on a conveyor belt which carries them to a freight car.



One man operates this St. Regis packer, which simultaneously fills and weighs 50-lb. Multiwall valve bags.

This flexible, portable conveyor delivers filled Multiwalls to the box car. Note flat, compact manner in which Multiwall valve bags stack.

ST. REGIS SALES CORPORATION
(Sales Subsidiary of St. Regis Paper Company)

NEW YORK 17: 230 Park Ave. **CHICAGO 1: 230 No. Michigan Ave.**
BALTIMORE 2: 2601 O'Sullivan Bldg. **SAN FRANCISCO 4: 1 Montgomery St.**

Mail this coupon for the complete story

Allentown Birmingham Boston Cleveland Dallas Denver Detroit Franklin, Va. Los Angeles Nazareth, Pa. New Orleans No. Kansas City, Mo. Ocala, Fla. Oswego, N. Y. Seattle Toledo

IN CANADA: St. Regis Paper Co. (Can.) Ltd., Montreal, Vancouver.

Without obligation, please send me full details regarding "Case History" No. 8, outlined above.

NAME_____

COMPANY_____

ADDRESS_____

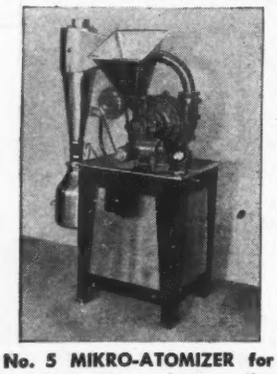
INTRODUCING....

a new and larger MIKRO-ATOMIZER

New No. 8 MIKRO-ATOMIZER

The No. 8 MIKRO-ATOMIZER represents a new and larger production unit capable of producing ultra-fine powders as low as 1 to 25 microns (under 325 mesh) in size. Using a 75 h.p. motor, this new mechanical screenless pulverizer is particularly applicable to tonnage operations.

Although having almost four times the size and capacity of the No. 6 MIKRO-ATOMIZER, the new unit retains all the features and basic principles that have made these new type pulverizers so popular in a varied number of plants. Guaranteed control of particle size is offered as with the smaller machine.



No. 5 MIKRO-ATOMIZER for small quantity production, pilot plant and laboratory work.

Compact and highly efficient, the new No. 8 MIKRO-ATOMIZER discharges into a stainless steel dust collector. Rotary air lock for continuously discharging material from the cyclone, is supplied. A number of modifications of the No. 8 machine are available in order to accommodate the wide range of different materials for which it is recommended.

A new No. 8 MIKRO-ATOMIZER purchased for your plant can provide increased tonnage of ultra-fine powders. Send for your copy of new bulletin and arrange for a free test grind of your material in a MIKRO-ATOMIZER.

PULVERIZING MACHINERY COMPANY

97 CHATHAM ROAD • SUMMIT, N. J.

NOW... 2 TYPES TO MEET MOST PULVERIZING NEEDS

MIKRO-PULVERIZER (FINE)

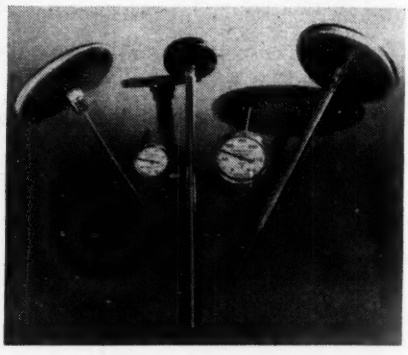
MIKRO-ATOMIZER (ULTRA FINE)

Reg. U. S. Pat. Off.

operator and the flame, thus providing protection from radiant heat. The chemical used forms no toxic gases, is a non-conductor of electricity, is non-abrasive, and is harmless to finished surfaces.

Bimetal Thermometer

THERMOMETERS, featuring permanently calibrated, highly accurate and responsive bimetallic helical coil measuring elements, are announced by Equipoise Controls, Dept. I, 100 Stevens Avenue, Mount Vernon, N. Y. The units have stainless steel cases,



Bimetallic dial thermometer.

18-8 stainless steel connection nut and stem, large easy-reading numerals and temperature graduations on metal dials. Unbreakable glass crystals can be furnished.

Expansion of bimetallic coil rotates attached small shaft and indicating pointer as one unit over entire scale range. There are no pivots, mechanical linkages or gears. Ranges between limits of -90 deg. F. and 1,000 deg. F. are available. Thermometers are obtainable in 2-in., 3-in. and 6-in. dial sizes.

Photoelectric Counter

"SHADOWCOUNT" is the name of a new photoelectric counter, capable of high counting speed that is manufactured by the Autotron Co., Dept. I., Danville, Ill. The maximum counting speed is 1,000 per minute. In most cases the instrument is installed in the production line, and when possible it is so placed that objects, as they are made or processed, can fall directly or by way of a chute, into a guide at the top of the instrument.

Percentage Timer

To automatically control the percentage of time any electrical circuit is closed or open, R. W. Cramer Co., Dept. I, Centerbrook, Conn., announce their "Type PE Percentage Timer."

A typical application is the operation of electric ovens and furnaces where time percentage regulation of current input permits extremely close control of temperature. This same principle gives equally good results in regulating the proportional flow of

"But you claim to be the tailor in the family"

"Aw, please, Nelly, you can sew on buttons better than I can."

"Didn't you just tell me that there wasn't another pipe coverer in the whole Armstrong crew that could sew canvas as neat and fast as you could?"

"Yes, but sewing canvas on magnesia covering is a lot different from sewing buttons on coats."

"Didn't you say that a good pipe coverer should be able to sew like a tailor?"

"That's right. And a good pipe coverer has to be able to handle all kinds of tools. Take plastering the finish on a nest of fittings for example; it takes real skill———"

"All right, Jim, let me have your coat. I'll sew on the button."

Jim is right about the requirements for a good pipe coverer, but he didn't explain all of them. If you have ever watched the fitting of magnesia covering, the trowelling of cement finish, the neat cutting and sewing of the canvas, you would have become aware of the many skills that a pipe coverer must apply in his trade. That is why it pays to have trained and experienced workmen install industrial insulations. And in every one of Armstrong's offices you will find crews of mechanics who have the experience and ability to install every type of heat insulation or low-temperature insulation job. The next time you have insulation work to be done let a skilled Armstrong installation crew make certain that your job is done properly.

Free! New Insulation Chart

If you use insulation to control any temperature, high or low, you'll want a copy of a new chart recently developed by Armstrong. This check list shows which kind of insulation, and how much of it, can most profitably be used to hold any given temperature from 300° below zero to 2800° F. Write today for your free copy to the Armstrong Cork Co., Building Materials Division, 4209 Maple Avenue, Lancaster, Pa.

ARMSTRONG'S INDUSTRIAL INSULATION

Complete Contract Service For All Temperatures

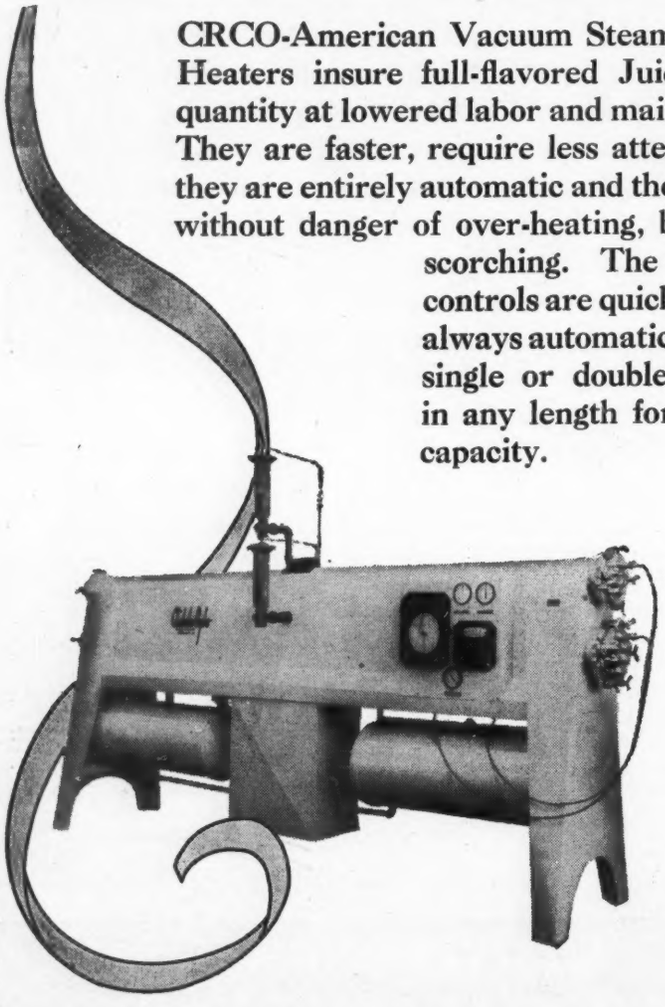
From 300° Below Zero

To 2600° Fahrenheit

Better Pre-Heating

CRCO-American Pre-Heaters
Will Improve the Quality . . .
and Lower Production Costs
in Any Juice Line

CRCO-American Vacuum Steam Design Pre-Heaters insure full-flavored Juice in greater quantity at lowered labor and maintenance cost. They are faster, require less attention because they are entirely automatic and they heat evenly without danger of over-heating, burning-on or scorching. The thermostatic controls are quick, positive and always automatic. Available in single or double-tube models in any length for any desired capacity.



WRITE FOR BULLETIN

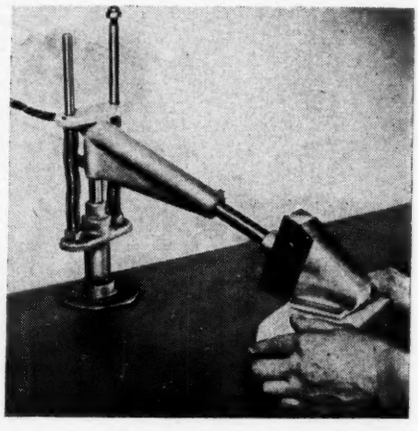
THE BEST OF Everything

CHISHOLM-RYDER
Niagara Falls, New York
FOR · THE · FOOD · PROCESSOR

materials or liquids and in many other operations. Graduations may be in percentage of time or directly translated to feet per minute, gallons per hour, or degrees of temperature. These timers will repeat within 0.25 percent on any given setting and their specially designed motors and operating switch mechanism are rated for continuous service. They are completely inclosed in dust proof bakelite housings.

Heat Sealer

FOR PLANTS where the volume is not great, Heat Seal-It Co., Dept. I, 4316 Lancaster Ave., Philadelphia, Pa., has provided a foot power heat sealer (Model 12-F). Outstanding features



Foot power heat sealer.

of this model are: (1) easy working kick-leg foot lever that applies pressure at the jaws ten times that exerted by the foot, (2) floating upper jaws mounted on springs that assure perfect jaw alignment at all times.

Controller

MANY improvements characterize controller Model 40, replacing Model 30, announces Foxboro Co., Dept. I, Foxboro, Mass.

DESIGN simplification and sturdier unit construction, result in superior performance, more flexible adjustments and easy replacement or interchange of unit parts. When the case door is open every part normally requiring attention is immediately accessible.

Setting of the proportional band, from 0 to 200 percent or higher, is easily made by the turn of a thumb wheel. Reversal of instrument action is made in like manner. The range of reset is 500:1 and, although not considered critical, is a continuous adjustment. A much improved adjusting device permits zeroing the pen without realigning the control point. A new type transfer switch enables changing from manual to automatic control, or vice versa, easily and rapidly.

Hasp and hinges of new design facilitate door opening or complete

WHITE-painted plant interiors help to provide better seeing and greater productive efficiency.

American industry recognizes the importance of quick, easy, accurate seeing to production efficiency and general employee welfare. And – because good seeing admittedly depends on good LIGHT, 63.1% of America's plants say they plan on improved lighting as a vital part of their "general modernization" programs.

If *your* plant is planning on better light for better seeing, don't forget that PAINT IS PART OF THE LIGHTING SYSTEM. Your local lighting engineer will tell you that white-painted plant interiors help make good lighting better because they reflect 80 to 90% of both natural and artificial light.

Furthermore, they help *distribute* the light evenly throughout the work area and reduce the harsh shadows and brightness contrasts which inhibit easy, accurate seeing. For down-to-earth data on this partnership of Light and Paint, send today for a free copy of "Light and Color in the Work-World."

BARRELED SUNLIGHT

PARTNERS OF LIGHT

FOR NEARLY HALF A CENTURY

U. S. GUTTA PERCHA PAINT COMPANY
37-I Dudley Sreet, Providence 1, Rhode Island

I'd like to know more about the partnership of Light and White Paint. Please send me a free copy of "LIGHT AND COLOR IN THE WORK-WORLD."

COMPANY.....

STREET AND NUMBER.....

CITY..... ZONE..... STATE.....

MY NAME IS.....

MY TITLE .....

© 1946 U. S. Gutta Percha Paint Company

HIGHER SPEEDS LOWER RATES!

NOW! THE LID IS OFF!
MORE PLANES, MORE FLIGHTS — FOR EVERYBODY
PRIORITIES NO LONGER NEEDED!

MANY SHIPMENTS now travel at air-speeds up to five miles a minute in the swift new planes that have joined the Airlines' fleets — bigger planes that make more space available for all kinds of traffic.

LOW RATES include special handling — pick-up and delivery — in all major U. S. towns and cities. (Often same-day delivery.) Rapid air-rail schedules to and from 23,000 off-airline communities in the country.

FOREIGN SERVICE direct by air to and from scores of countries — the world's best service, in the world's best planes.

RATES CUT 22% SINCE 1943 (U. S. A.)					
AIR MILES	2 lbs.	5 lbs.	25 lbs.	40 lbs.	Over 40 lbs. Cents per lb.
149	$1.00	$1.00	$1.00	$1.23	3.07¢
349	1.02	1.18	2.30	3.68	9.21¢
549	1.07	1.42	3.84	6.14	15.35¢
1049	1.17	1.98	7.68	12.28	30.70¢
2349	1.45	3.53	17.65	28.24	70.61¢
Over 2350	1.47	3.68	18.42	29.47	73.68¢
INTERNATIONAL RATES ALSO REDUCED					

WRITE TODAY for the Time and Rate Schedule on Air Express. It contains illuminating facts to help you solve many a shipping problem. Air Express Division, Railway Express Agency, 230 Park Avenue, New York 17, N. Y. Or ask for it at any Airline or Railway Express office.

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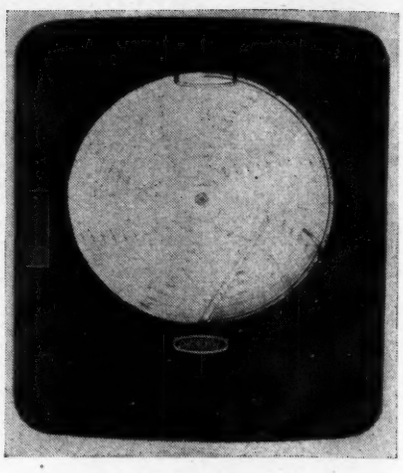


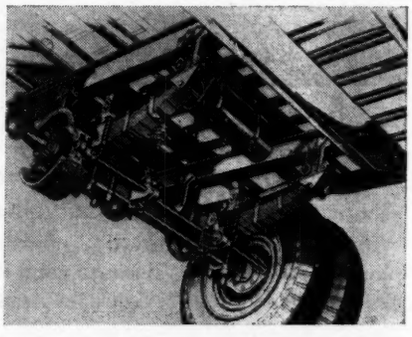
Model 40 controller.

removal, and also insure tight closure against dust, moisture and fumes. All connections are in the bottom of the case.

Model 40 is made as an indicator as well as a single-pen and multi-pen recorder, and is available for on-off control action, proportional, proportional and reset, proportional with derivative, and proportional and reset with derivative.

Springs for Trailers

A SPRING suspension system for trailers has been introduced by Fruehauf Trailer Co., Dept. I, Detroit, Mich. It operates on the so-called "slip-end" principle, intended to balance the rate

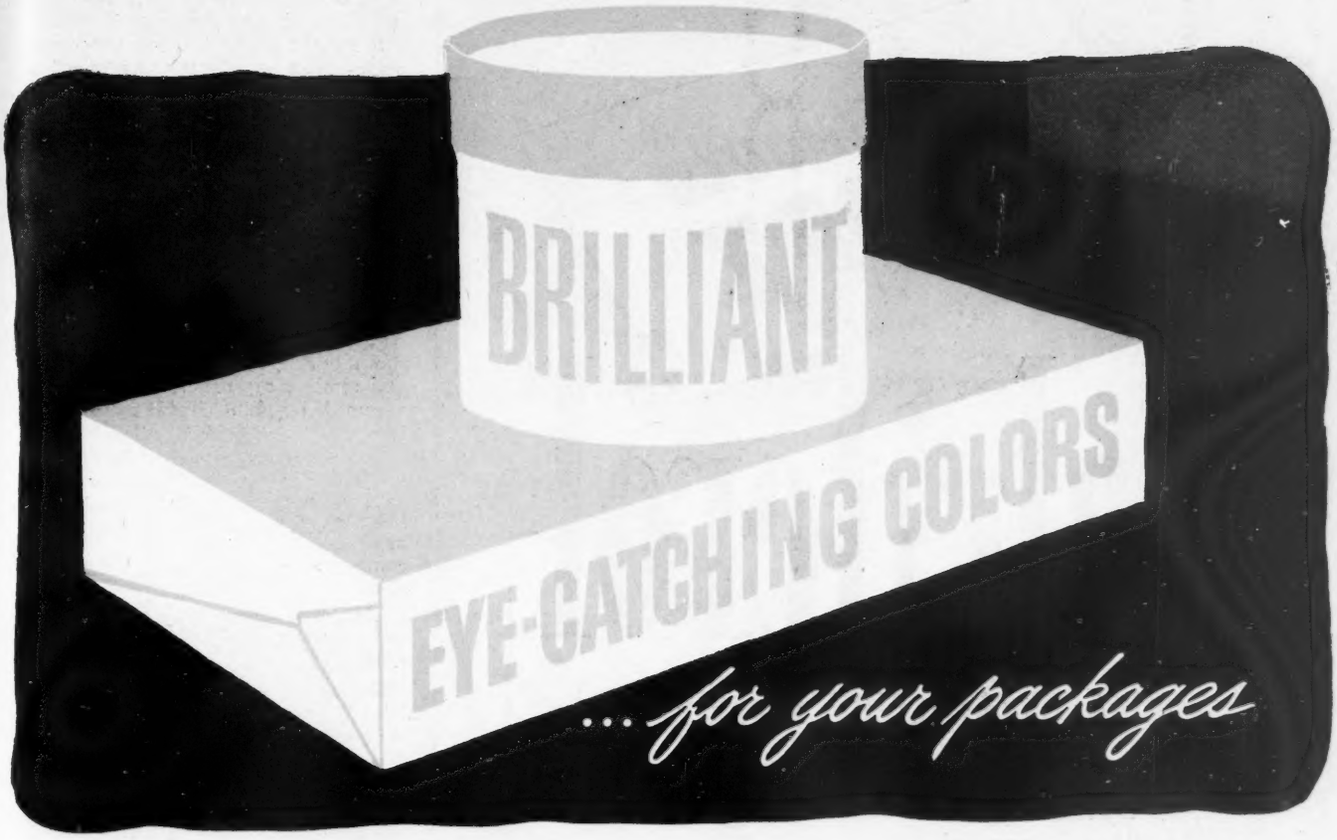


Spring suspension system.

of spring stiffness with the load carried. The ends of the bowed spring leaves rest on roller bearings. When the trailer is empty only the longest, top spring is carrying the load. As the weight increases, the bowed springs begin to straighten, bringing more leaves into play.

Speed Changer Control

FOR THE remote control of variable-speed drives, Yardeny Laboratories, Inc., Dept. I, 105 Chambers St., New York 7, N. Y., has introduced the Flectrol, which consists of a control motor and remote control box, connected together by means of a flexible shaft. The motor is applied to the speed changer. The graduated dial on



LATEST DEVELOPMENT IN PRINTING INKS... DRIES AT ONCE, ODORLESS

Many food, confectionery and tobacco packaging problems are now eliminated by the use of this quick-drying, odorless ink . . . HYDRY.

Developed by Michigan Research Laboratories, subsidiary of Sun Chemical Corporation, HYDRY is a moisture-set-ink—on presses equipped with steam applicators it drys and hardens instantly! No more waiting days or weeks for ink to dry. Waxing, folding or die-cutting operations can be started as soon as sheets come off the press.

And HYDRY is absolutely odorless—no residual ink odors to affect milk, cheese, butter, shortening, meat, cakes, breads, cereals, ice cream, sugar, flour, chewing gum, candy, tobacco or any one of numerous other products. Prints bright and clean, in a full range of brilliant colors.

Check your packaging problems against HYDRY's features in the box below. Write on your letterhead for 16-page booklet describing characteristics of HYDRY and giving practical information for use.

- **Fast Drying**—Dries on most stocks in 10 to 30 minutes; on presses equipped with steam applicator, dries *instantly!*
- **Odorless**—Finished prints entirely devoid of ink odor.
- **Brilliant Colors**—Ink film reflects light, gives brilliance and cleanliness.
- **Non-Offset**—Possibilities of offset reduced to a minimum.
- **Non-Smear**—Dry-hard finish extremely resistant to rubbing and smearing.
- **Non-Crystallizing**—Can be overprinted, even after several weeks.
- **Sharper Printing**—Does not spread or bleed.
- **Folding Qualities Improved**—Affords better moisture content in paper.
- **Improves Heat-Sealing of Waxed Wrappers**—Will not mix with wax film during heat-sealing operations.

hydry

GENERAL PRINTING INK COMPANY DIVISION

Sun Chemical Corporation, 100 Sixth Avenue, New York 13, N. Y.

American Printing Ink • Eagle Printing Ink • Fuchs & Lang • Geo. H. Morrill • Pacific Coast • Sigmund Ullman
E. J. Kelly Company • General Printing Ink Corporation of Canada, Ltd.

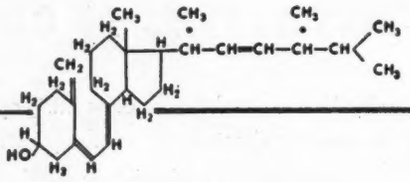
Sun CHEMICAL CORPORATION

YOU SHOULD ADOPT

Calciferol

(PURE CRYSTALLINE VITAMIN D_2)

Calciferol is the name applicable *only to the superior, pure crystalline product* as so recognized and used throughout the world.



WRITE FOR DETAILS AND NEW LOW PRICE SCHEDULE

Winthrop's pure crystalline synthetic vitamin D_2 (Calciferol) is free from lumisterol, toxisterol, suprasterol, and other by-products of irradiation. It never varies in antirachitic potency.

OTHER WINTHROP PURE SYNTHETIC VITAMINS:

- TRIDEE—Winthrop's Brand of vitamin D_3 In Corn Oil
- VITAMIN B_1 (Thiamine Hydrochloride)
- VITAMIN B_2 (Riboflavin)
- NIACINAMIDE
- VITAMIN B_6 (Pyridoxine Hydrochloride)
- CALCIUM PANTOTHENATE
- VITAMIN C (Ascorbic Acid)
- AMINO-ACIDS

Valine	Glutamic Acid
Cystine	Tryptophane
Tyrosine	Phenylalanine
Leucine	Methionine

- "B-E-T-S"—Winthrop's Brand of Bread-Enrichment Tablets
- "VEXTRAM"—Winthrop's Brand of Flour-Enrichment Mixture

POTENCIES AND PACKINGS:

Crystalline Form in vials of one, five, and ten grams.

Solution in Corn Oil: 1,000,000 U.S.P. Units per gram* packed as follows:

400 Standard Units	2,500 Standard Units
1,000 Standard Units	50,000 Standard Units

Also Solution in Corn Oil: 400,000 U.S.P. Units per gram packed as follows:

250 Standard Units	1,000 Standard Units
500 Standard Units	20,000 Standard Units

*Standard Unit=1,000,000 U. S. P. Units

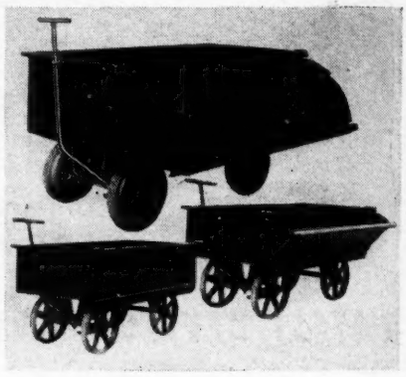
WINTHROP

For prices and information address
Special Markets Division
WINTHROP CHEMICAL COMPANY, INC.
170 Varick Street, New York 13, N. Y.

the control box can be set to any desired speed and the speed changer will follow as rapidly as the electric servo-motor can drive the speed adjusting screw. The setting of the control dial is said to give precise indication of the speed to the operator. This dial can be calibrated in revolutions per minute, feet per minute, gallons per hour, or other units as desired.

Load Cart

A CART, which is particularly useful for handling coal, sand, ashes, cement and similar aggregates, has been announced by The Market Forge Co., Dept. I, Everett, Mass. The height of the truck from the floor makes it very convenient for shoveling materials in or out. The drop side is designed in such a way that it may be locked in



Drop side load cart.

closed, half-open or fully opened position. The unit is furnished with 16-in. diameter pneumatic rubber tires, making it suitable for traversing poor floors or for use in outdoor areas. When handling such materials as coal its capacity is about 1,000 lb. It has a volume of 22½ cu. ft. All wheels are provided with Hyatt roller bearings with forced lubrication.

Larger and smaller sizes are also available.

Work Glove

MADE of canvas impregnated with milled neoprene, a new work glove offered by the Synthetic Division of Pioneer Rubber Co., Dept. I, Willard, Ohio, is suitable for jobs that are too wet and sloppy for other types of work gloves. The milled neoprene is said to be tougher and more durable than the latex type and the impregnating process is such that the canvas and neoprene are joined in a permanent bond.

Automatic Oil Purifier

A COMPLETELY automatic oil purifier that removes food particles, keeps acidity low, improves color, flavor and odor in oils and fats used in the cooking or processing of food products is announced by the Honan-Crane Corp.,

MADE TO ORIGINAL SPECIFICATIONS

Genuine Jeffrey Replacement Parts

Not *similar to*, but *exactly like* or even better than original equipment. That's the Jeffrey rule. That's why knowing production men insist on replacing with Jeffrey maintenance items.

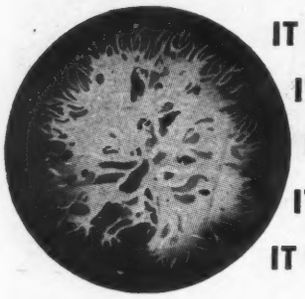
Look For The Trade Mark

JEFFREY

ESTABLISHED 1877

Something New Under the Sun

. . . A UNIVERSAL COLLOID AGENT



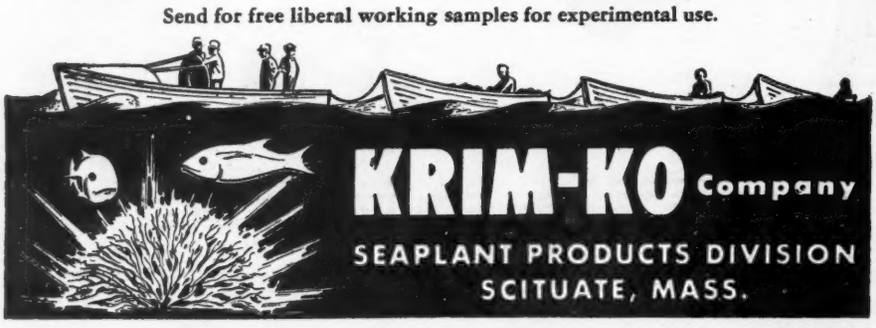
IT THICKENS . . .
IT GELS . . .
IT EMULSIFIES . . .
IT STABILIZES . . .
IT SUSPENDS . . .

We are now producing from Carragheen two new improved types of gelose. One of them should be the answer to your emulsifying, suspending, thickening or stabilizing problems.

KRIM-KO GEL is an all-purpose colloid-assistant. Properly used, it has been proved effective in many of the most exacting food, pharmaceutical and industrial applications.

CARRAGAR is an agar-type gelatin which forms tender, fruit-like gels over a wide pH range. It does not require acidulation to produce desired results.

Send for free liberal working samples for experimental use.



KRIM-KO Company
SEAPLANT PRODUCTS DIVISION
SCITUATE, MASS.

Why CYCLONE gives you better conveyor belt service!

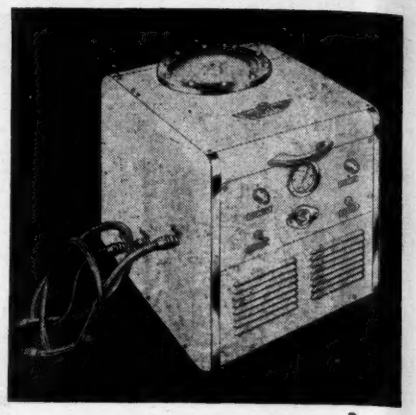
Cyclone has been making metal conveyor belts for over 25 years and a wealth of technical knowledge is at your disposal. You will find our engineers qualified to help you select the belt best suited to your special operating conditions. Because Cyclone makes *three* different types of metal belts (Flex-Grid, Chain Link and Flat Wire) in a wide variety of metals, alloys and finishes, you can be sure that our recommendations for your job will be the best possible solution to your problem. Cyclone's reputation is your guarantee of satisfaction. Offices in principal cities . . . factories in Midwest and on Pacific Coast. Write for *free* catalog No. 3.

CYCLONE FENCE DIVISION · American Steel & Wire Co. · USS CYCLONE "Red Tag" METAL BELTS · UNITED STATES STEEL

By the makers of Cyclone Fence

CYCLONE FENCE DIVISION
(AMERICAN STEEL & WIRE COMPANY)
Dept. H-96, Waukegan, Illinois
United States Steel Export Company, New York

UNITED STATES STEEL



Frying oil purifier.

Dept. I, 706 Wabash Ave., Lebanon, Ind. It also helps to prevent excessive smoking, removes odors, insures better tasting foods, and eliminates residues that gum up equipment in such operations as making French fries, doughnuts and similar deep fried products.

The unit is operated with only two switches, with signal lights indicating correct temperature. The purifying elements are complete cartridge type refills. Model M-o has a white enamel cabinet with chrome plated lid and comes equipped with two 4-ft. lengths of flexible metal braid hose. It is powered with a ¼-hp. motor and has a capacity of 20 to 30 g.p.h.

Protective Leggings

PROTECTION of the legs and shins of industrial workers against heat, sparks, hot metal and acid splashes and abrasions is afforded by the new Guardwell Frank leggings made by Safety Clothing & Equipment Co., Dept. I., 7016 Euclid Ave., Cleveland 3, Ohio. The body of the legging is made from either Underwriters' grade asbestos, grade 1 chrome tanned heat resistant leather, fireproofed duck, or impregnated synthetic duck, depending on the use to which the leggings will be put. The inside front of the legging is reinforced with heavy canvas and between the canvas and the body of the legging are inserted two pieces of fiber for extra protection against splash and impact. Side stays of non-rusting metal keep the legging in a firm, upright, comfortable position on the leg and provide proper adjustment to any leg size.

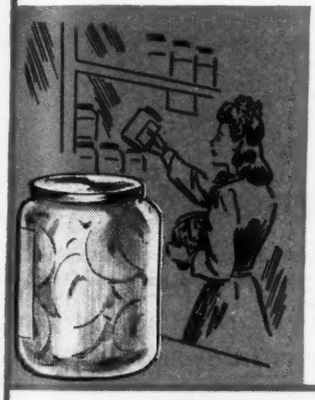
Silicone Rubber Gaskets

NOTABLE improvements in gaskets for drying and baking ovens may be expected by the use of silicone rubber, according to engineers of the General Electric Co., Dept. I, Pittsfield, Mass. This material is outstanding because of its heat resisting qualities and flexibility at both high and low temperatures. Tests reveal that silicone rubber increases slightly in hardness after a year's heating at 300 deg. F. but retains considerable flexibility. Another feature of the material is

SURVEYS PROVE...
GLASS CONTAINERS PREFERRED 2 to 1

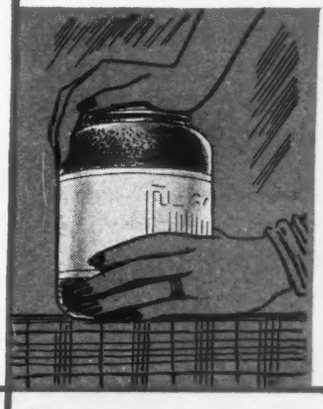
Glass containers boost sales! That's been proved! A renowned public opinion analyst* recently made a national survey of women's packaging preferences . . . established a preference of over 2 to 1 for products** packed in the modern container—the glass package!

Here are some of the reasons why more and more women prefer to buy glass-packed products:



VISIBILITY

A glass container invites product inspection. Its color, amount and condition are on display. Luscious, glassed fruits catch the eye of a customer who is "looking for a delicious dessert!"

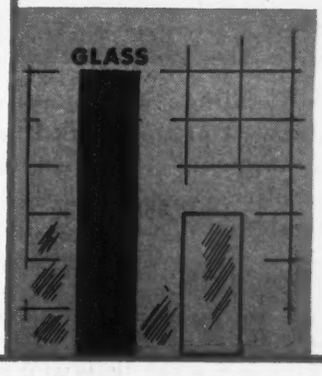


PROTECTION

Sanitary glass containers do not affect the flavor, aroma. Coffee is ultra vacuum-packed in the new Duraglas Ultra-Vac jar. Flexible cap seals in freshness—reseals it in between uses.

CONVENIENCE

Easy-to-keep-clean glass containers are preferred for household products, too! They are quickly opened—show how much is on hand. Women prefer glass-packed furniture polish, 3 to 1!



PREFERENCE

Alert young women who are just now joining the ranks of homemakers register an emphatic 3 to 1 preference for products packed in glass. Their vote indicates the growing swing to glass!

The popularity of these containers is growing . . . growing because their many advantages are basic. You sell more—need less selling time with products that are packed in glass containers—Duraglas Containers!

*Name supplied on request.

**Average is based on eight key classifications: pears, peaches, fruit salad and cocktail, baby food, coffee, salad or cooking oil, beets, food-beverages.

ESPECIALLY IN Duraglas CONTAINERS

TRADE MARK REG. U.S. PAT. OFF.

OWENS-ILLINOIS GLASS COMPANY · TOLEDO 1, OHIO · *Branches in Principal Cities*

Time is money—save it by use of the CLARK Trucloader, newest of the Clark line of industrial haulage vehicles. Light, compact—yet sturdy as the famous Clipper, Carloader and Utilitruc. Let a Clark Field Engineer plan for you an efficient method of material handling—today!

Write for "Trucloader Broadside," it's free.

LIFTS – CARRIES – TIERS

GAS OR ELECTRIC POWERED

Prices on CLARK products will not be advanced in excess of increased costs

CLARK TRUCTRACTOR

Division of CLARK EQUIPMENT COMPANY

BATTLE CREEK, MICHIGAN

OTHER PLANTS – BUCHANAN, JACKSON, BERRIEN SPRINGS, MICHIGAN

Other CLARK *Products*

FORK LIFT TRUCKS
DUMP & SHOVEL TRACTORS
RAILWAY TRUCKS
METAL SPOKE WHEELS
TRANSMISSIONS
AXLES AND HOUSINGS
DRILLS & GEARS
ELECTRIC STEEL CASTINGS

that it will not adhere to metal or other material in spite of continued use at high temperatures and under oxidizing conditions. This eliminates the possibility of any vulcanizing action to metal at high temperatures. The chemical inertness of the silicone rubber is further evidenced by its non-gassing characteristics under high vacuum at elevated temperatures.

Spray Nozzles

CEMENTED tungsten carbide used in making parts for nozzles for spray drying of foods have shown a comparative service life from 50 to 100 times that obtainable with nozzles made of conventional metals. These nozzles are molded and supplied to Spraying Systems by Carboloy Co., Inc., Dept. I, Detroit, Mich.

Such foods as milk, albumen, eggs, coffee, ice cream mix, and other liquids

Exploded view of high pressure nozzle with tips and orifice insert of cemented tungsten carbide.

containing abrasive solids, are sprayed through high pressure nozzles of the general type. The core tip and the orifice insert, are the portions of the nozzles where the greatest amount of wear is experienced, and these parts are made from cemented tungsten carbide.

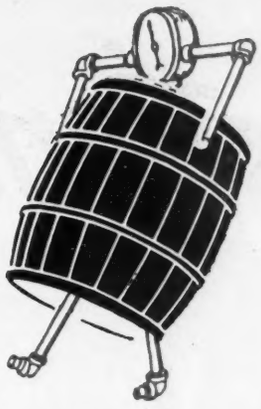
Gravity Conveyor

TO MEET the need for a complete light duty gravity assembled unit that can be instantly rolled to any job and adjusted to any desired height from floor, the Island Equipment Corp., Dept. I, 101 Park Avenue, New York, has placed on the market what is called a "Jack Knife Gravity Conveyor". The legs can be raised or lowered from 6 in. to 52 in. by merely loosening two wing bolts. When desired, one end can be made lower than the other giving greater or less pitch to the top.

Portable Pyrometer

FOR use where a rugged, flexible light weight and accurate portable pyrometer is an essential requirement for quality control, Wheelco Instruments Co., Dept. I, 847 W. Harrison St., Chicago, Ill., announces a new extension-type portable pyrometer. The de-

DON'T BUY STEAM EQUIPMENT



"stripped"

A new dryer, washer, press or any other steam operated machine which arrives at your plant without the correct steam traps and temperature controls is as ready to go places in your scheme of production as the proverbial poker player in a barrel. He may pick up some clothes in a friendly store and you may buy "some traps and control" at your jobber's, but will they be tailor made for the job?

Leading manufacturers of steam equipment have spent months and sometimes years with Sarco Engineers to design, adapt or select the one best trap and control for their equipment. They know where and how it should be installed.

IT'S INSURANCE FOR THE MANUFACTURER AND FOR YOU

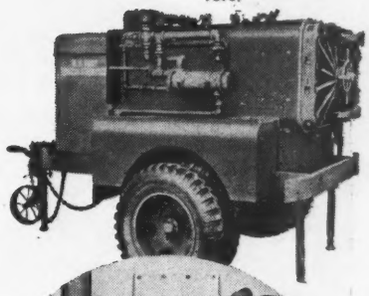
Proper traps and control accomplish four things. 1. They insure maximum output from the machine. 2. The quality of the product is duplicated day after day, because of the constant temperatures. 3. Service complaints are practically eliminated. This is important where the equipment is to be used hundreds or perhaps thousands of miles from the nearest manufacturer representative. 4. The cost for fuel, water, or cooling is invariably reduced. This item alone usually pays for a good trap or temperature control in a few months.

ASK YOUR MANUFACTURER FOR SARCO *on these machines—*

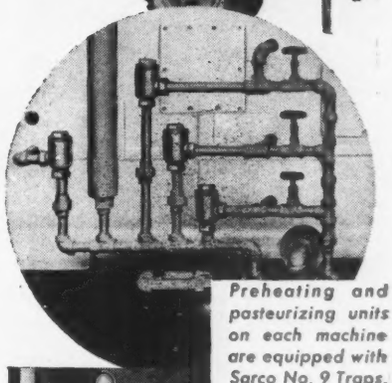
Here are a few of the products now insured at the point of origin with Sarco traps and control.

Air Conditioners	Coolers	Hot Water Tanks	Preheaters
Bottle Washers	Degreasers	Humidifiers	Steam Tables
Can Washers	Diesel Engines	Kettles	Stills
Chocolate Dip	Dryers	Ovens	Sterilizers
Compressors	Film Washing	Pasteurizers	Vacuum Pans
Cookers	Heaters	Plating Tanks	Vacuum Sealing

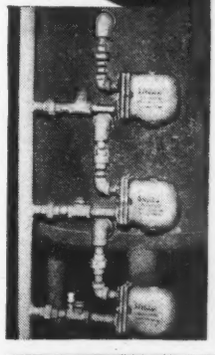
102



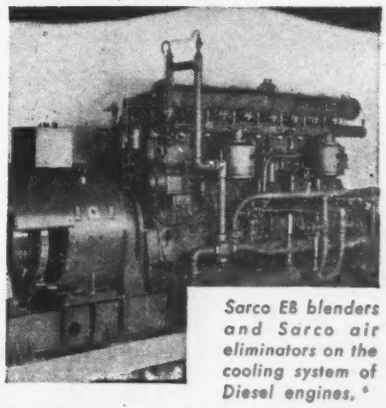
Hundreds of these mobile sterilizers and water heaters are equipped with Sarco TR-50 temperature regulators.



Preheating and pasteurizing units on each machine are equipped with Sarco No. 9 Traps.



Sarco FT steam traps are used on these huge milk evaporators.



Sarco EB blenders and Sarco air eliminators on the cooling system of Diesel engines.

FOUR STARS ON OUR E PENNANT TESTIFY TO SARCO PERFORMANCE IN THE WAR EFFORT

ARMY E NAVY

SARCO SAVES STEAM

Represented in Principal Cities

SARCO COMPANY, INC., 475 FIFTH AVE., NEW YORK 17, N.Y. • Sarco Canada, Ltd., 85 Richmond St., W., Toronto 1, Ont.

Question:

Would you like to spend LESS money in cleaning equipment?

IN the busy plants of many well-known manufacturers of food products, the use of Oakite methods and materials has proved a starting point for effecting worthwhile savings not only in money, but in time and effort in equipment clean-up work.

Here Are the Reasons for This:

To each food product plant Oakite Personalized Cleaning Service brings a combination of practical experience, extensive knowledge of food processing and handling operations, familiarity with various equipment and metals, and highly important, the "know-how" of applying the most economical cleaning and germicidal methods and materials for more easily maintaining a high standard of equipment and plant sanitation.

Fact-filled Sanitation Manuals FREE for the Asking

If you are interested in finding low-cost, better ways to protect food products against bacteria, mold and other contaminating organisms, let us give you the benefit of our years of successful experience. Factual Oakite Sanitation Manuals on your industry are free for the asking. Won't you write today?

OAKITE PRODUCTS, INC.
26G Thames Street, New York 6, N. Y.
Technical Service Representatives Located in All Principal Cities of the United States and Canada

Plant-Tested Sanitation Data Available for These Food Processing Industries:

- Meat Packing
- Vegetable & Fruit Canning
- Fish Canning
- Frozen Foods
- Dairy & Ice Cream
- Baking

OAKITE *Specialized* **CLEANING**
MATERIALS • METHODS • SERVICE

sign permits choice of plug-in angle extensions where applications necessitate the use of different kinds of thermocouples.

Plug-in extensions are available in either straight, 45 or 90 deg. angle types. Adapters permit choice of material and calibration of thermocouples. The pyrometer is contained in a sealed, dustproof, aluminum case having a pistol grip handle that may be locked in a horizontal or vertical position for ease of operation. Bare, Marshall or surface thermocouple tips may be selected.

Portable Electric Lamps

A PORTABLE electric lamp, capable of delivering a brilliant 1,500 ft. beam or a bright localized light, is announced by U-C Lite Mfg. Co., Dept. I, 11 East Hubbard St., Chicago 11. It is powered by two standard dry-cell batteries with pressure-type connection. It weighs 7 lb. and can be set down anywhere or clamped in a special hold-down fixture accessory. It is particularly suitable for truck fleet owners, and other commercial uses.

Portable electric lamp.

Liquid Fuel Strainer

LIQUID Fuel "Purifier" made by Skinner Purifiers Inc., Dept. I, 1500 Trombly, Detroit 11, Mich., is now available for civilian use. It is a complete unit that can be attached in the fuel line of trucks, cars, or oil-burning equipment. The feature of the unit is the cartridge through which the fuel travels on its way to the combustion chamber, removing impurities that might be in the fuel. To clean, remove the cartridge, and blow it out.

Industrial Thermometer

READABILITY of industrial thermometers is said to have been greatly increased with the introduction of a new type of mercury tube produced by the Philadelphia Thermometer Co., Dept. I, 4401 North Sixth Street, Philadelphia, Pa. The tube is elliptical in shape with the bore so placed that the mercury column is magnified to the

Savings . . . will pay for equipment *in less than 6 months*

SPUDS

MANUFACTURERS AND DISTRIBUTORS OF
SPUDS POTATO CHIPS
AND OTHER QUALITY FOOD PRODUCTS

TELEPHONES CANAL 5592 5593 5594

715-725 W FIFTEENTH STREET · CHICAGO 7, ILLINOIS

March 7, 1946

Triangle Package Machinery Company
906-924 North Spaulding Avenue
Chicago 51, Illinois

Gentlemen:

Attached is our order for three more of your automatic potato chip packing machines.

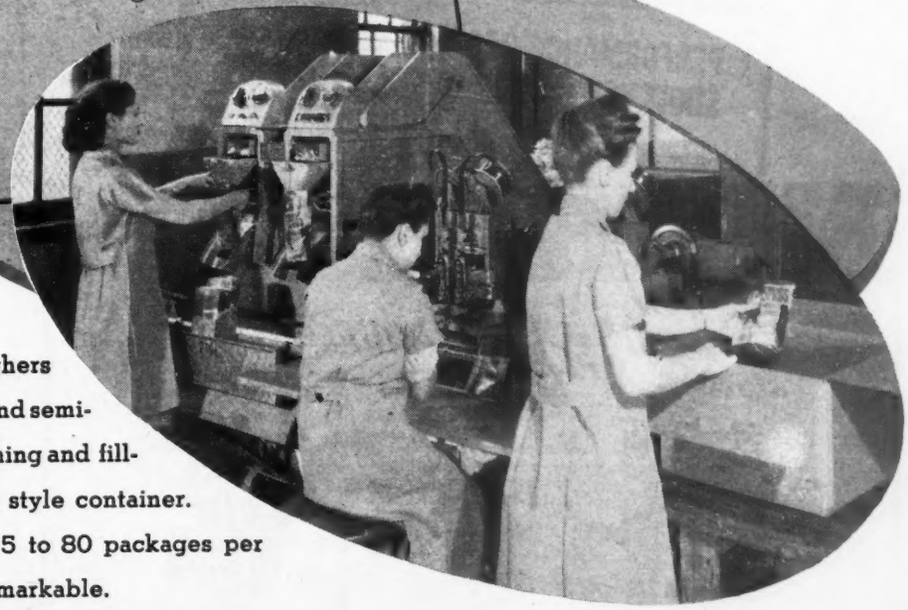
We are sending you these orders because the packaging machine you recently installed for us has been so satisfactory that we feel we can no longer afford to pack by hand. The savings in labor have been so startling that we believe conservatively our savings will pay for the original cost of the equipment in less than six months. Even more important to us, however, is the fact that the packing is done in a clean, sanitary manner with no breakage of potato chips.

Thank you for the splendid service you have given us.

Very truly yours,

SPUDS

- WANT 3 MORE MACHINES!
- STARTLING LABOR SAVINGS!
- CLEAN, SANITARY PACKAGING!
- NO BREAKAGE!
- CAN NO LONGER AFFORD TO PACKAGE BY HAND!



Triangle Elec-Tri-Pak Weighers are available in automatic and semi-automatic models for weighing and filling dry products into any style container. Production ranges from 15 to 80 packages per minute. Accuracies are remarkable.

ASK FOR 20-PAGE ILLUSTRATED CATALOG.

Headquarters for high speed precision weighing and filling machines.

TRIANGLE ELEC-TRI-PAK WEIGHERS

TRIANGLE PACKAGE MACHINERY CO.
922 N. SPAULDING AVE., CHICAGO 51, ILL.

SALES OFFICES IN: SAN FRANCISCO; BIRMINGHAM; DENVER; CLEVELAND; NASHVILLE; DALLAS; MEMPHIS; NEW YORK; NORTH QUINCY, MASS.; MONTREAL, CANADA; MEXICO

LEADER FOR 50 YEARS

JAMISON-
BUILT COLD STORAGE DOORS
HAGERSTOWN, MARYLAND

BRANCHES IN PRINCIPAL CITIES

PERFORMANCE RECORDS POSITIVELY SHOW YOU CAN PROMOTE EFFICIENCY
with

NICHOLSON
"Plant-Proved"

TRAPS

Nicholson Thermostatic Steam Traps have largest discharge capacity of any trap in their price range. Cannot freeze, water-log or air-bind. 5 types: size ¼" to 2". Sent on trial. Bulletin 544.

FLOATS

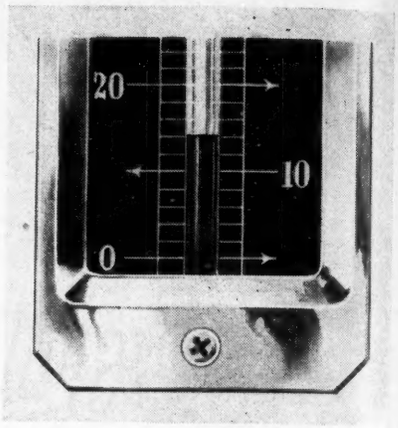
Nicholson Welded Floats are of stainless or chromium-plated steel; spherical, cylindrical, elliptical. For every heavy-duty use. 2" to 14". Bulletin 746.

VALVES

3-way valves for single, 4-way for double-acting cylinders; multi-port, metering, distributing, special types. For air, steam, oil, gas, tar, water. Lever, foot, solenoid, motor-operated types. Catalog 546.

Send for Catalogs or See Sweet's

W. H. NICHOLSON & SON 193 OREGON ST. WILKES-BARRE, PA.



Easily read industrial thermometer.

full width of the tube. The yellow tube back, equal in width to the mercury column and visible only above it, forms sharp color contrast at the point of temperature reading. Thermometer cases and frames are designed to admit maximum light to both tube and calibrated scale while cutting down glare and reflections.

Neoprene Coverall

IMPERVIOUSNESS to oil and greases, and high resistance to acids and alkalies, is claimed for the new buff colored neoprene-coated coverall introduced by Benson & Associates, Dept I, 310 South Michigan Ave., Chicago 4, Ill. Produced for this concern by the United States Rubber Co., the coverall completely protects the worker from neck to shoe-tops. Protected zipper closures are provided at the front, at wrists and at ankles. A hood which can be snapped on at the back of the collar, protects the entire head from splashes and spray, and is designed to permit goggles or face masks to be worn comfortably when the hood is in place. The coverall is light in weight, weighing less than 3 lb., and is especially useful for tank cleaning of all types.

Expendable Pallet

LOADS of 4,000-lb. can be be carried on a four-way pallet announced by Techtmann Industries, Dept. I, 714 West Wisconsin Avenue, Milwaukee 1, Wis. A 60 percent reduction in weight is achieved by the use of a double corrugated board top supported on square or round wood blocks.

Tests show that this pallet will survive a number of trips without appreciable damage under normal conditions of shipment by rail or truck. The cost is so low that it can be discarded after a single trip. Maximum load storage is attained in the standard 42x48 in. size since multiples of these dimensions nearly equal the widths of truck and box car bodies. Over 1,300 empty pallets, weighing approximately 30,000 lb., can be nested in a 50-ft. box car using a lift truck for handling.

CATALOGS, BULLETINS

This digest of manufacturers' new publications is offered by FOOD INDUSTRIES Readers' Service as a convenience for executives. To obtain this literature, fill in the coupon, clip to your letterhead, and mail to FOOD INDUSTRIES.

Food Plant Equipment

Filters 1

The Blackburn-Smith Mfg. Co.'s 8-page booklet features the Refiner, a pressure leaf type filter for clarifying and polishing; this filter is claimed to break tight emulsions and remove oil from condensate down to 0.01 ppm. Principles of operation, design, together with specifications and sizes are given.

Wood Tanks 2

O. G. Kelley & Co. has released a 16-page booklet illustrating and describing the various types of wood tanks manufactured by this company. A wide variety of apaplications are illustrated. Tables of dimensions, capacities and weight of the various types of tanks are given.

Heat Exchangers 3

Griscom-Russell Co.'s Bulletin 1614 is a 16-page catalog illustrating and describing the twin G-Fin element used in heat transfer equipment. The outstanding features of this equipment are listed in tabular form with corresponding advantages. Construction details, including specifications, sizes, dimensions, for the different types of elements, are illustrated and listed.

Sifters 4

Richmond Mfg. Co. has released a 16-page booklet illustrating and describing the Niagara sifters for use on a wide variety of materials in the process industries. The basic principle of Niagara sifters is described and illustrated. Each of the several models is described briefly and is illustrated with application pictures and cross-sectional diagrams. Capacities, dimensions and specifications are included.

Industrial Locomotives 5

Vulcan Iron Works has three bulletins. Nos. A-418, A-402, and A-410, featuring industrial diesel-electric locomotives for use in manufacturing plants, mines, mills, etc. Specifications, capacities and performance data are included.

Turbine Pumps 6

Worthington Pump & Machinery Corp. Bulletin RP-277 is a 4-page illustrated reprint entitled "Influence of Groundwater Level on Turbine Well Pump Performance."

Refrigeration 7

Niagara Blower Co.'s Bulletin No. 100 features the Niagara liquid cooler for accurate temperature control of chilled water or solutions. Operating principles are given and various applications are suggested.

Dielectric Heating 8

Induction Heating Corp.'s 4-page leaflet illustrates and describes the Thermonic dielectric generators manufactured by this company. A discussion of dielectric heating is given, and the various models of the Thermonic heaters are shown.

Insulated Pipe Conduit 9

The Ric-Wil Co.'s 8-page booklet features the installation and application of insulated pipe conduit systems in a large industrial plant. Diagrammatic sketch of a complete steam distributing system as well as several installation photographs are included.

Water Strainer 10

S. P. Kinney Engineers, Inc., offer a 4-page circular featuring the Brassert self-cleaning water strainer in 3-in. to 30-in. pipe sizes and in capacities up to 3,000,000 gal. of water per min. This equipment is illustrated and described, and includes capacities, straining media, and other engineering data.

Industrial Brushes 11

Asborn Mfg. Co. has announced a 24-page booklet entitled "How to Select Power Brushes for Manufacturing Operations." It contains useful tables to aid in selection of the proper type of brush for various applications.

Pumps 12

Ingersoll-Rand Co. Bulletin 7057 is a 20-page illustrated catalog covering the design, construction, and engineering details of the Cameron single-stage general service pumps manufactured by this company. Applications and installations are illustrated and some typical pumping problems are described.

Rotary Vacuum Filtration 13

String discharge in economical continuous filtration is covered in Bulletin 101, by Filtration Engineers Inc. The compression and washing mechanism, drum-drier combinations, construction details and typical applications of rotary vacuum filters are also covered in this well-illustrated bulletin.

Automatic Wrapping Machine 14

A folder, which contains general information on automatic wrapping, labeling and imprinting machines, has been released by the Oliver Machinery Company. Typical products wrapped, ranging from doughnuts and other bakery products to fresh fruits, fresh produce and meats, are shown.

Laboratory Pumps and Stirrers 15

Midget pumps and laboratory stirrers are described in a catalog printed by the Eastern Engineering Co. It contains descriptions and illustrations of many new models for regular industrial use, as well as special types recently developed.

Filter 16

How "Apple Honey" and wine are filtered, how candy scrap is up-graded to a bland, neutral sirup, and many other similar case histories are described in a two-color booklet, No. A-246, published by Niagara Filter Corp. Most of the applications described are in the food, fermentation and process industries.

Steam-Jacketed Kettles 17

Royce L. Parker, Inc., describes and illustrates, in a 4-page bulletin, stainless steel full steam-jacketed kettles. A diagram of a typical kettle illustrates how the design gives quick and perfect drainage, together with freedom from both rivets and screws.

Homogenizers and Pumps 18

Homogenizing equipment and pumps are discussed and illustrated in a 20-page brochure, Catalog No. 10, issued by Marco Co., Inc. Various size units are described, rating from the small laboratory batch model up to Model A, which has a capacity of 1,000 g.p.h. Applications in the food field include canned juices, peanut butter, ice cream, milk and confections.

Stainless Steel Valves 19

Four-page Bulletin No. 2 describes stainless steel valves made by the Alloy Steel Products Company. The chemical composition and the mechanical properties of the alloy used are given. Construction of the various types of valves is shown. Applications and advantages are enumerated.

Steam Generating Unit 20

Steam Generating Unit designed for full steam pressure in as little as 18 minutes, is described in Bulletin No. 1214, released by Orr & Sembower, Inc. This unit is a "packaged" power plant consisting of boiler, oil burner, condensate return system and an automatic control system. It comes on a structural steel base completely assembled and wired for easy installation.

Pumps 21

Two bulletins describing various types of pumps have been issued by Warren Steam Pump Co. Inc. Bulletin No. 242 describes and illustrates the "Compacunit line." These are available with motor or turbine drives, open or inclosed impeller. Capacities range from 5 to 300 g.p.m., and heads from 225 to 500 ft.

Bulletin No. 240 gives design and consumption data on type "DBL" centrifugal pumps. They range in capacity from 50 to 600 g.p.m. with heads from 120 to 260 ft. operating at 3,500 r.p.m. These are available in 1½ in. to 3 in. discharge sizes.

Process Heating 22

Details of "Superthern Systems" of process heating, using superheated water, are described in a 12-page booklet just issued by Blaw-Knox Co.

Chemical Porcelain 23

Lapp Insulator Co., Inc., has released a 28-page bulletin, No. 244, describing and illustrating chemical valves, pipes and fittings, towers and special shapes made of chemical porcelain.

Resilient Couplings 24

Simplicity of design and longer life of couplings are stressed in Bulletin SL-1000-1, published by Crocker-Wheeler Div., Joshua Hendy Iron Works. A cutaway view shows features that the manufacturer states produces the advantages of (1) great

Good until December, 1946

FOOD INDUSTRIES READERS' SERVICE

FOOD INDUSTRIES, 330 W. 42nd St., New York City 18

Please have manufacturer send me, without obligation, literature circled below.

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9-46

YOU DON'T EAT THE HUSKS WHEN YOU EAT CORN

because Corn Husks are *not* what you want. So in seasoning your food products, why load them with hulls, sticks, impurities and unsightly waste materials when all you want is the *true* SPICE FLAVOR of natural spices?

In Stange's Cream of Spice Seasonings, through our exclusive process of extraction, you get a product containing *ALL* the essential oils and aromatic oleo resins of the natural spices, concentrated in an easy-to-use form,—with all foreign matter disposed of.

C.O.S. (Cream of Spice) Seasonings have TRUE spice flavor—with a uniform Degree of Strength.

To get TRUE spice flavor—use Stange's C.O.S. Seasonings.

Stange's
CREAM OF SPICE SEASONINGS

• WM J. STANGE CO. •
2540 W. Monroe St., Chicago 12, Ill.

shock absorbing capacity, (2) freedom from noise and vibration, (3) elimination of lubrication, (4) longer life and (5) ease of lining up.

Dowtherm Heating 25
In a 34-page booklet, ID-46-3, Foster Wheeler discuss the theory and application of dowtherm heating systems. It tells what dowtherm is, what its properties are and how it has characteristics that fundamentally differ from water in a heating system. A number of flow diagrams are given showing specific applications, such as in continuous deodorization of vegetable oils, continuous fatty acid distillation, mineral oil processes and similar operations requiring elevated temperatures at relatively low pressures.

A-C Generator 26
Electric Machinery Manufacturing Co. in a 4-page bulletin, Publication No. 186, announces an a.c. generator for use in engine generator sets that provide power at constant voltage.

Plant Supplies

Insulation 27
A revised edition of Philip Carey Mfg. Co.'s heat insulation materials catalog is now available. It covers such insulating materials as magnesia, asbestos, sponges, diatomaceous earth, calcined aggregate, mineral wool, corrugated asbestos types of insulation. Insulating, bonding and refractory cements are also covered. Heat loss tables, selection charts and data for determining insulation thickness, and other information are included.

Combustion Deposits 28
How combustion deposits on boiler tubes and refractories are softened and broken down to a soft powder by a product called "Gamlenite" is described in a 4-page bulletin issued by Gamlen Chemical Co. Regular use of the material prevents accumulation of combustion deposits and extends time between shutdowns.

Celanese Synthetics 29
Celanese Plastics Corp. has published a 20-page bulletin on "Celanese Synthetics," which describes plastics and their characteristics, including mechanical and electrical properties and some of their applications.

Vanilla Flavoring 30
A 12-page booklet, entitled "Palate-appeal," has been announced by the Aromanilla Company, Inc. It discusses the relationship between taste and flavoring, with particular emphasis on baked goods, confectionery, ice cream and other food products.

Floors 31
Slip proof and wear resisting features of alundum aggregate used on floors, stairs and ramps are described and illustrated in an 8-page booklet released by the Norton Company.

Steel Shapes 32
In a 12-page booklet, well illustrated, Jessop Steel Co. describes its facilities for the making of various tool steel castings. Chemical and metallurgical supervision are emphasized. Patterns may be furnished by customer or they can be made by Jessop from customer's blueprints.

DDT Emulsion 33
DDT emulsion and its uses in food plants or agricultural and dairy buildings are described in a 6-page color leaflet, published by the Pennsylvania Salt Mfg. Co., which gives instructions for applying this 34 percent solution. One gallon will make enough spray to cover 14,000 sq. ft. of surface.

Dry Ice 34
The manufacture, distribution and uses of dry ice are covered in a 32-page illustrated booklet from the Mathieson Alkali Works, Inc. One of its features is a series of charts estimating amounts of dry ice

Economy in packaging

. . . calls for protection against loss by leakage, or contamination by outside contacts.

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. . . have the strength and tightness for safely packaging the thinnest liquids or penetrating products. Losses and product contamination are eliminated.

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AN UNBEATABLE INSECT-KILLING TEAM!

You owe it to yourself and your customers to get acquainted with Difuso and Difusolier. They offer you a method of insect control that is safe, effective, easy to use and economical. Wherever food is prepared or served, Difuso is indispensable because it is absolutely harmless, will not taint food in any way. The Difusolier, expertly combines steam and Difuso and sends the resultant superfine spray into every insect hiding place . . . drives out and kills bugs of all kinds. Difusolier, with Difuso, gives fast, penetrating, never-miss action for maximum killing power without waste. Investigate this safe, sure method of insect control. Send for your free copy of this revealing folder today!

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required to maintain various temperatures in refrigeration units of many different sizes. Included are an ice cream packing chart and a table showing temperatures required for protection of fresh, dried, smoked and frozen fruits, vegetables, meats, sea foods and dairy products. Important factors in dry ice refrigeration, such as design and packing of trunk bodies, bunkers and storage cabinets, are discussed and plans for a dry ice storage box are given.

Control Equipment

Flow and Level Controller 35
Bulletin No. 449 on controlling feed flow and water level on Foster Wheeler Type S-A steam generators has just been released by Northern Equipment Co. This 4-page bulletin gives data on operating pressures, describes water flow control and how it operates.

Photoelectric Control 36
Photoswitch Inc., has published sheet 317-P, covering Series 20 and 21 high-speed photoelectric controls. Specifications and assembly information is given.

Flow Indicator 37
A rate of flow indicator for water, steam and air is described and illustrated in Bulletin No. 360, issued by Builders-Providence, Inc.

Electronic Pyrometer 38
Standard combinations of recording and indicating electronic potentiometer pyrometers are described and illustrated in a 16-page bulletin, No. 232, released by Bailey Meter Co. In it are given general specifications, a table of standard parts available, a description of electronic control as well as air-operated control, signals and alarms.

Percentage Timer 39
A percentage timer designed by R. W. Cramer Co., Inc., for use on alternating current to automatically control the opening or closing of any electric circuit at given intervals is described in Bulletin No. 2500B. It regulates the input to electrically operated furnaces and similar equipment and controls the proportionate flow of materials or liquids.

Pneumatic Positioners 40
Catalog Section 55-A on pneumatic positioners for use with rotameter to operate remote instruments has just been released by Fischer & Porter Co. Instructions and schematic diagrams are given to show the use of these instruments and how to adjust them in remote locations.

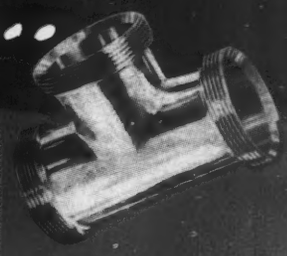
Time Switches 41
Specially built time switches are treated in a 4-page bulletin, T-55, just released by the Automatic Temperature Control Co., Inc. Six typical examples of time switches are illustrated and in each instance wiring diagrams or additional descriptive material may be secured.

Humidity Indicator 42
A humidity indicator that provides visual means of detecting changes in relative humidity and known as "Proteck-Sorb" is described in a 4-page leaflet released by The Davison Chemical Corp.

Portable Pyrometer 43
Bulletin D602-4 describes and illustrates Wheelco Instrument Company's complete line of portable pyrometers. They are available for single and double scales and with or without multiple rotary switches. Specifications for the proper selection of extension holders, adapters and thermocouple tips are listed in chart form.

Instruments 44
Davis Emergency Equipment Co.'s circular is now available featuring the Stack-O-Meter for indicating carbon dioxide, stack temperature and draft readings. Specifications and descriptions of the various features are included.

To give you Fittings faster...



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• Prompt delivery of all the TRI-CLOVER sanitary fittings and specialties you need is a huge problem . . . but we *are* doing something about it. We've taken over an entire new plant, thereby adding 125,000 sq. ft. of *productive* capacity.

In addition, we've added many new machine tools to both new and existing plants. As a result of this added space and machinery, plus the use of latest design and fabrication methods, our production capacity today is almost 300% greater than at any pre-war period . . . and it's all aimed in one direction—*to get better TRI-CLOVER products to you faster!*

what you can do . . .

• To improve deliveries, we suggest first that you anticipate your present and future needs as carefully as possible, to avoid last-minute order changes. Second, you will get faster delivery by specifying any of the Approved and Accepted Fittings listed below, as these items are in greatest demand and we are tooled up to produce them in greatest volume.

Your TRI-CLOVER Jobber is anxious to help—consult him now.

• Fittings designated and accepted as meeting the 3-A Sanitary Standards by the appropriate Committees of the International Assn. of Milk Sanitarians, U. S. Public Health Service, and Dairy Industry Committee:

2-C Bend	7-B Tee	15-R Ferrule
2-F Bend	9 Cross	16-A Cap
2-K Bend	10-BF Valve	30-F Angle Valve
2-P Bend	10-C Valve	31-15 Reducer
7 Tee	13-H Hex Nut	32-15 Reducer
7-A Tee	14-R Ferrule	33-F Can Filler

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Kenosha Wisconsin

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Sanitary Fittings, Valves, Pumps, Tubing, Specialties

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The period of heavy competition among all foodstuffs draws near.

Mrs. Housewife of today knows that vitamins are essential food elements for proper nutrition. You can count upon her to check your labels for vitamin declarations. She will buy enriched food values wherever possible.

Be ready to meet this challenge. Study the possibility of improving your product through enrichment with 'ROCHE' vitamins. Let enrichment *help your product on the steep climb ahead.*

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FOOD TECHNOLOGY
NEW DISCOVERIES AND INVENTIONS

FATS AND OILS

Comminuted Shortening

DRY siftable shortenings, which can be substituted for the usual bread shortenings with a saving of from 15 to 35 percent in fat, are the subject of a recent patent.

According to the patent, a quantity of skim milk is pasteurized and condensed until approximately 50 percent of the water is removed. While in the condenser soybean lecithin and a dispersion of algin are added. The solution is passed to a hot well and a quantity of cottonseed oil (approximately 10 percent of the original skim milk volume) is added. The mixture is thoroughly agitated, homogenized at a pressure in excess of 2,000 lb., and spray-dried to obtain a product practically free from moisture. When substituted for an equal weight of lard, in a batch of bread dough, it is claimed that a normal loaf of full volume will result.

Variations from the above procedure include the use of whey for skim milk, lecithin from eggs or milk, or equivalent edible colloidal emulsifying agents, alginates, agar-agar, gum acacia, or gum tragacanth, and edible fats or oils in the liquid, semi-liquid or solid state.

Digest from U. S. Patent 2,392,833, issued January 15, 1946, on an application dated March 3, 1943, to E. K. Chapin, and assigned to Beatrice Creamery Co., Chicago, Ill.

Extracting Cottonseed Oil With Hexane

SOLVENT extraction of cottonseed for oil has not been successful due to the dark color of the oil produced. By using hexane as a solvent only a small amount of gossypol and related substances, responsible for color in oil and soapstock, are extracted. The hexane is removed by heating the oil solvent mixture under vacuum at a temperature not exceeding 105 deg. F. A mixture (miscella) of oil and solvent (30 to 40 percent oil) is obtained. This is further concentrated under a 24-in. vacuum to about 90 percent oil. This miscella is finally stripped of solvent by means of steam under vacuum.

The water-oil emulsion formed during the stripping operation may be broken by salting-out, centrifuging, or vacuum-drying, the last being the best method.

By a slight modification of the A.O.C.S. refining methods, oils were obtained equal in quality to high-grade hydraulic-pressed oils.

Color fixation became objectionable when the miscellas were heated between 150 and 180 deg. F.

Engineering data for design, installation and operation of solvent extraction oil processes are included in original article.

Digest from "Solvent Extraction of Cottonseed and Peanut Oil. Effect of Heat on Cottonseed Oil Miscellas," by H. L. E. Vix, E. F. Pollard, J. J. Spadaro and E. A. Gastrock, *Industrial and Engineering Chemistry*, vol. 38, 635-642, June, 1946.

SANITATION

Control of Bacteria In Food Storage Rooms

ONCE surface dirt is removed, the ideal method of controlling microbial contamination of food preparation and storage rooms would be an air distribution of the killing agent whereby organisms in the air as well as those on the surface would be destroyed. A number of such procedures are discussed.

A study was made to determine the value of germicidal lamps, with a wave band of 2,537 Angstrom units, in the control of microorganisms in conjunction with a project on high temperature tenderizing of beef. Quarters of beef were placed in two walk-in coolers, one equipped with germicidal lamps. Temperature and humidity of the two boxes were the same, and quarters from the same animal were used. Five areas on each quarter were sampled for microbial content. The boxes were maintained at 60 deg. F. for 48 hours then cooled to 33 deg. F. Samples were collected at the start and each 24 hours during the storage period. Ultraviolet rays not only suppressed the growth of bacteria but also caused a material reduction, while the beef without lights had an increased population.

To determine the influence of the lamps on the control of bacteria in the shadowed areas of the meat, metal shields were installed so that no direct rays would strike the surface of the beef. A marked suppression of bacteria, similar to that obtained in the experiments with direct irradiation was obtained. Quantitative tests disclosed concentrations of ozone somewhat less than 0.1 ppm. in the refrigerator. To determine the significance of ozone on the suppression of microbial growth a small low pressure mercury vapor quartz generator was placed in one of two refrigerators containing comparable forequarters of beef at 60 deg. F. This machine maintained approximately 0.1 ppm. of ozone. The ozone treated beef had about the same bacterial count as at the start, but the untreated beef showed an increase of 600 percent.

Experiments were made to determine the effect of propylene glycol on molds and bacteria common to cold storage rooms. Cultures of various organisms were sprayed into the air of a walk-in cooler, followed immediately by spraying a vaporizing propylene glycol. Vegetative cells of spore forming bacteria were reduced in numbers, but the spores were not affected. Water suspensions of various disinfectants were also sprayed into the air in an attempt to destroy bacteria and molds suspended in it. All disinfectants with low phenol coefficients gave results comparable to spraying with water alone.

Data are given on the bacteriostatic and bactericidal value of CO_2 as a supplement to refrigera-

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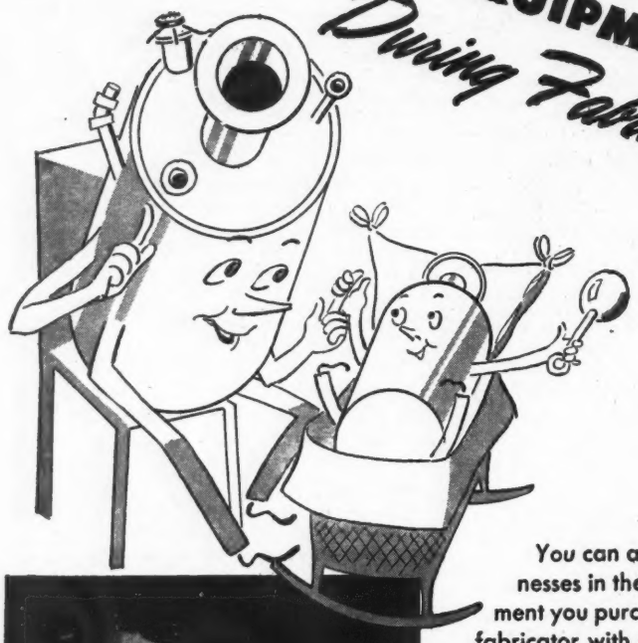
PROTECTING YOUR STAINLESS STEEL EQUIPMENT
During Fabrication



You can avoid hidden weaknesses in the processing equipment you purchase by selecting a fabricator with specialized experience in working with this alloy. Stainless steel is a tricky metal to work. When you bend it, form it, weld it, your fabricator must use shop procedures that safeguard the original properties of the metal. And he must have the plant machinery, engineering skill, and trained manpower to carry out these protective procedures.

As custom builders of processing equipment working *exclusively* with stainless steel alloy—we offer this specialization to our customers. It assures you processing equipment with no hidden weaknesses—equipment that lasts longer, works more efficiently for your application. Consult with us.

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CORROSION RESISTANT PROCESSING EQUIPMENT

TANKS • KETTLES • STILLS • HEAT EXCHANGERS • AGITATORS • MIXERS • TOWERS • PIPING

tion for preservation of food products. It was concluded that CO_2 atmospheres, even as low as 2.5 percent, have a marked effect in reducing microbial multiplication. Data are also given on the effect of hypochlorites and quaternary ammonium chloride compounds as direct surface disinfectants.

Due to the fact that surface sanitizers have only a limited action on spores, gross contamination of spores must be removed by thorough washing and flushing before treatment.

Digest from "The Control of Microorganisms in Food Storage Rooms," by W. L. Mallmann and E. S. Churchill, *Refrigeration Engineering*, vol. 51, No. 6, 523-528, June, 1946.

FRUITS

Retention of Flavor In Frozen Strawberries

FLAVOR retention in frozen strawberries is definitely correlated with sugar penetration into the berries and original sugar concentration surrounding them. A study was made at the Louisiana Agricultural Experiment Station, to determine the effect of: (1) Various ratios of sugar to berries, using both cane sugar and cane sirups of various strengths; (2) freezing whole and sliced fruit and (3) various methods of freezing.

Strawberries of the Klondike variety were stemmed, and washed by immersion in ice cold water. Berries were sliced by passing them through a laboratory model of the commercial-type berry slicer making slices ⅜ in. thick. After mixing the berries with the desired amount of sugar or sirup they were packed in cellophane bags and heat sealed. The bags were placed in cartons and over-wrapped with glassine. Laboratory examinations were begun after 16 months in storage at 0 deg. F. and organoleptic tests after 19 months.

Only slight differences were observed in samples frozen in still air and on freezing plates. Preservation of the characteristic flavor was much more pronounced in the sliced berries than in the whole berries, and those packed in dry sugar had better flavor retention than those packed in sirup. The addition of dry sugar resulted in better sugar absorption than when sirups were used, and the absorption was higher in packages frozen immediately than those held for one hour before freezing. Delay before freezing also increased inversion of sucrose.

(*Turn to page* 202)

the definitions and standards and enriched noodle products

THE Federal Food and Drug Administration, Federal Security Agency, has now promulgated and approved the standards and definitions for enriched macaroni and enriched noodle products.

These regulations were published in the July 9, 1946 issue of Federal Register. They become effective on October 7, 1946.

Even if you do not manufacture macaroni or noodle products, you should be interested in this news. More fortified foods mean more nutritional help for all America.

If there are no definitions and standards under which your food product is made, you may fortify it without hesitation.

Your company—whether it manufactures macaroni products or other food products—may have plans under way for further fortification of foods.

Standard Brands Incorporated has spent much time and research in recent years developing products for vitamin B-complex, vitamin D and protein supplementation of foods. These products are known for their dependability and uniformity.

If you are now seeking ways of fortifying your company's products, we invite you to discuss your needs in confidence with one of our executives.

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Fleischmann's Hy-Dee
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NATURAL B COMPLEX FACTORS

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Pure Dry Primary Yeasts *(Brewer's Strain)*

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DAMP-TEX FOR
WET
OR DRY SURFACES

STEELCOTE MFG. CO.
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Canadian Manufacturer:
Standard Paint & Varnish Co.,
Windsor, Canada

A ratio of 1 lb. of sugar to 4 lb. of berries or 1 to 5 when dry sugar was added gave an excellent product. Sliced fruit in all cases had better flavor than whole fruit with corresponding sugar ratios.

Data are given on the various ratios of sugar and sirup to berries and on the solutions removed from the frozen berries.

Digest from "Freezing Experiments on Strawberies," by E. A. Fieger, C. W. DuBois and S. Kalogereas, *The Fruit Products Journal and American Food Manufacturer*, 297-301, June, 1946.

DAIRY

Lecithin Added to Dairy Products Before Drying

FAT-CONTAINING powdered dairy products having improved miscibility, solubility, flavor and keeping quality, and the method for making such products, are the subject of a recently patented invention. The discovery comprises thoroughly dispersing lecithin or lecithin-containing substances in the fluid product to be powdered, the amount added to be confined within the ranges of 0.5 and 3.0 percent.

Specific benefits claimed are: (1) That the reconstituted product does not have the defect of chalkiness, but has the freshness and richness of flavor of the original fluid product; (2) powdered cream will go into suspension in cold water with a minimum of stirring and (3) reconstituted products do not become foamy to the same extent as products made by conventional methods.

This process is applicable to powdered milk, powdered milk-skim milk mixtures, powdered cream, powdered milk cream mixtures and powdered ice cream mixes.

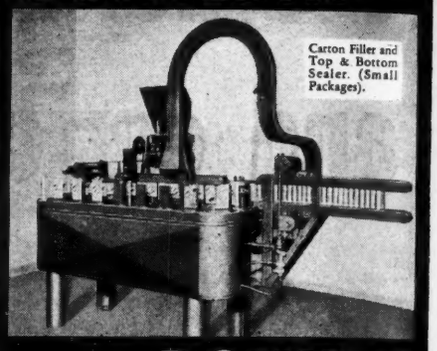
Digest from U. S. Patent 2,399,565, issued April 29, 1946, on an application dated July 29, 1942, to G. C. North and A. J. Allen, and assigned to Beatrice Creamery Co., Chicago, Ill.

Homogenized Milk In White Sauces

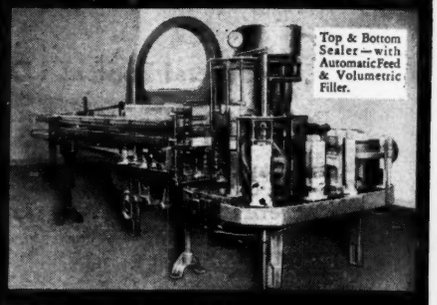
WHITE sauces, made from homogenized milk, instead of being smooth and homogenous often have a separated curdled appearance. Evidently the difficulty is that of fat separation.

White sauces were made in small aluminum double boilers, using 244 g. of milk with various portions of flour, salt and fat. Fats used were bacon, beef, sausage, mixed drippings and butterfat. The milk was homogenized at 2,500 lb. pressure. Sauces were cooked for 5 minutes

OUNCES...



...TO POUNDS



. . . these PACKOMATICS Fill and Seal both Carton Tops and Bottoms

From miniature sized packages on one machine, to commercial-sized packages on the other, these PACKOMATICS are time, labor and MONEY SAVERS! PACKOMATIC "double sealers" automatically (1) glue and seal carton bottoms; (2) convey them under filler; (3) glue and close tops; (4) carry them in belt compression sealer to discharge point. Commercial package unit has optional mechanism that feeds flat cartons from magazines, opens, squares and places them on forms. No operator required! Inquiries incur no obligation!

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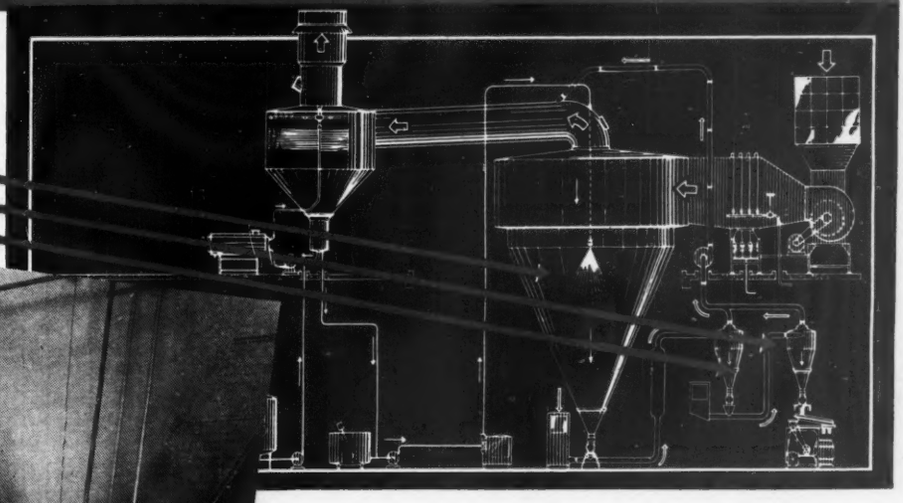
How 3 Stage Drying controls moisture content

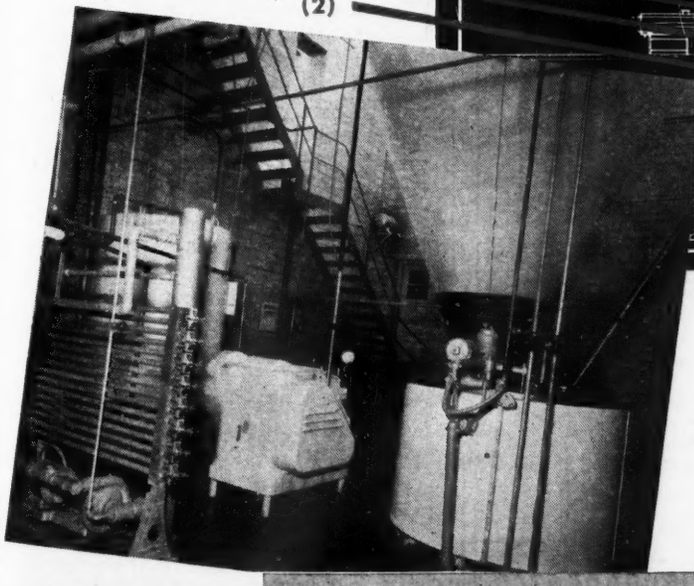
● The three separate drying steps used in the Swenson Gray-Jensen Process reduce the moisture content of the powder to an extremely low level. In the first stage—the large drying chamber—hot air reduces the liquid to powder containing 3½% to 5% moisture. This powder then passes successively through warm and cool air cyclones that reduce moisture to less than 2% (whole milk) or 3½% (skim milk). Thus moisture in the finished product is well below the maximum allowed by D. M. A. and F. D. A. standards.

Swenson controlled drying yields a product with better keeping qualities. It also retains natural color and flavor and high vitamin content . . . because drying is practically instantaneous and powder is evacuated from the heat zone immediately.

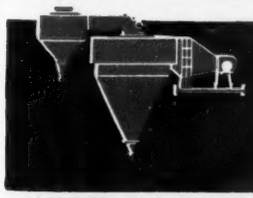
Bulletin D-100 fully describes the operation of Swenson Gray-Jensen Spray Dryers ● ● ● **WRITE FOR A COPY TODAY.**



These are the three stages—(1) atomized fluid meets hot dry air; (2) powder meets warm dry air; (3) powder meets cold dry air.



Part of a typical Swenson Gray-Jensen milk plant installation, showing tubular heater, high pressure pump, drop tank and bottom of cone-shaped drying chamber.



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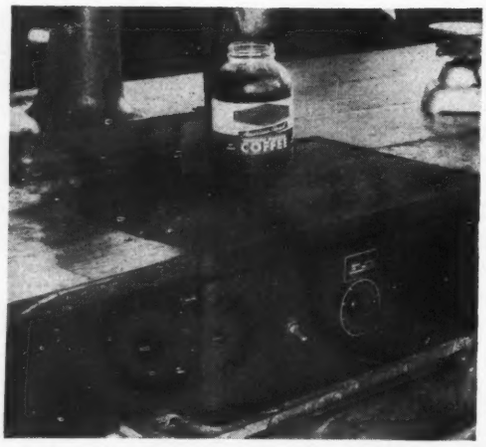

VP-15 Electric Packer settling coffee

and Save You—

Money By reducing the size of container, saving shipping space and saving space on retailers' shelves.

Time and Labor By speeding up filling processes and eliminating slow, laborious hand pounding, bumping and jarring.

Your customers like to see a full container.

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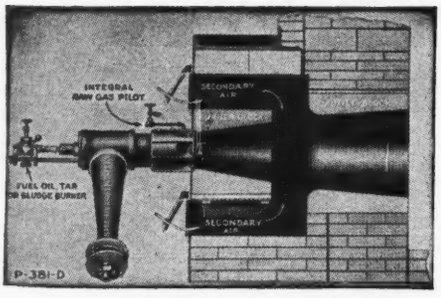
NATIONAL AIROIL FUEL OIL - GAS BURNERS

TANDEM COMBUSTION UNIT
. . . economical and efficient . . .



FOR POWER, PROCESS and HEATING

The Tandem Combustion Unit can be "lighted off" in a cold furnace and brought, quickly, to full capacity with a clean flame. It is economical and efficient, has a high turndown ratio, with a steady flame, adaptable to high-low combustion control; and can maintain a high flame temperature on either gas or fuel oil. The flame (regulated and directed) uniformly radiates heat to the absorber vessel without flame impingement.

Burning fuel oil, tar, sludge or gas, the Tandem Combustion Unit is extremely versatile, is economical of fuel and requires minimum supervision and maintenance.

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at 194 deg. F. When the fat was omitted, smooth sauces resulted regardless of type of milk used. As the fat was increased there was a corresponding increase in fat separation. Little difference was noted between samples, as far as fat separation was concerned, until more than 11 g. of fat were used. Kind of fat seemed to be of little significance. Salt was not the cause, but a contributing influence to separation.

When beaten for two minutes sauces made from homogenized milk remained smooth upon standing and retained this smoothness when cooled and reheated. A practical technic for producing acceptable sauces, made from homogenized milk, is to bring about a finer dispersion of the fat globules by means of beating.

Digest from "Some Cooking Qualities of Homogenized Milk. II. White Sauces," by A. M. Towson and G. M. Trout, *Food Research*, 261-273, May-June, 1946.

MICROBIOLOGY

Bacterial Fertilizer

INOCULATION of seeds with bacteria to increase yields, used by the Russians since 1932, has been further developed by Dr. Otto Siegel in laboratories near Stuttgart, Germany.

Siegel claims to have isolated several strains of *Azotobacter chroococcum*, each of which is specifically adapted for symbiosis with an individual species of plant, including grains. The bacterial strains were obtained as follows: Different species of seeds were inoculated with a mixture of many strains of *Azotobacter*. After a period of growth in soil, cultures were taken from the roots and adjacent soil. The organisms so obtained were then used to inoculate more seeds of the same kind and the process continued until the surviving bacteria were thought to be all of one strain.

The selected strains were next grown on coarsely ground peat containing about 70 percent water, to which a little phosphate, potassium and (if too acid) calcium hydroxide were added. After 3 or 4 days at room temperature the peat was mixed with the seeds in the proportion of 2 to 3 percent, and the seeds planted immediately.

Effects of the inoculation are threefold: (1) A delivery of growth accessory substances; (2) an increase in the nitrogen content of the plant and (3) when strains selected as above were employed

THOUSANDS OF FOOD PRODUCTS OWE THEIR SHELF-LIFE FRESHNESS TO RHINELANDER PROTECTIVE PAPERS

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These little mimics learn young. Even tho play-acting, they express ideas born in the home where Mother, family food purchasing agent, is ever alert to the importance of flavor-freshness. Probably in no other country has food processing been carried to such heights. To maintain this peak condition in packaged edibles over extended periods of storage and store-display requires highly functional enclosures; in particular, flexible wrappers, bags and carton liners resistant to moisture, vapor, oil or grease transmission.

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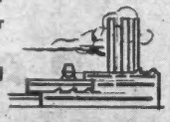

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Strong; durable; resists fruit and vegetable juices; does not impart odor or taste; clean, sanitary appearance; requires minimum care.

GLOBE SOLID WOVEN COTTON BELTING

Manufactured especially for hard usage where a tough strong belt is essential.

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A perfect conveyor for use in bakeries, cereal products, candy plants, etc.; easily washable with soap and water; heat-resisting, sanitary, waterproof.

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1403 CLINTON ST.
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there was a marked increase (more than 20 percent) in the harvest yield of the crop, over that obtained on unfertilized soils. Data are given to substantiate the foregoing claims.

Digest from "Bacterial Fertilization for Field Crops: Data from Dr. Otto Siegel," by A. K. Balls, *Joint Intelligence Objectives Agency*, Flat Final Report No. 494, November 28, 1945.

CEREAL PRODUCTS

Stable Peanut Butter

PEANUT butter, having enriched nutritive value and characterized by its high degree of stability in the emulsified state, can be produced by recently patented methods of manufacture.

According to the patent, roasting of the shelled peanuts, cooling, blanching and grinding to provide a homogeneous mass of comminuted peanuts are followed by the incorporation of a wetting agent, such as lecithin. Other products that may be added in addition to the wetting agent are: Flavoring agents such as salt, sugar or chocolate; edible or inedible oil, fat, grease or wax, or hydrogenated peanut oil.

Digest from U. S. Patent 2,397,564, issued April 2, 1946, on an application dated October 7, 1942, to J. L. Rosefield, J. M. Rosenfield and M. Rosenfield, Alameda, Calif.

STORAGE

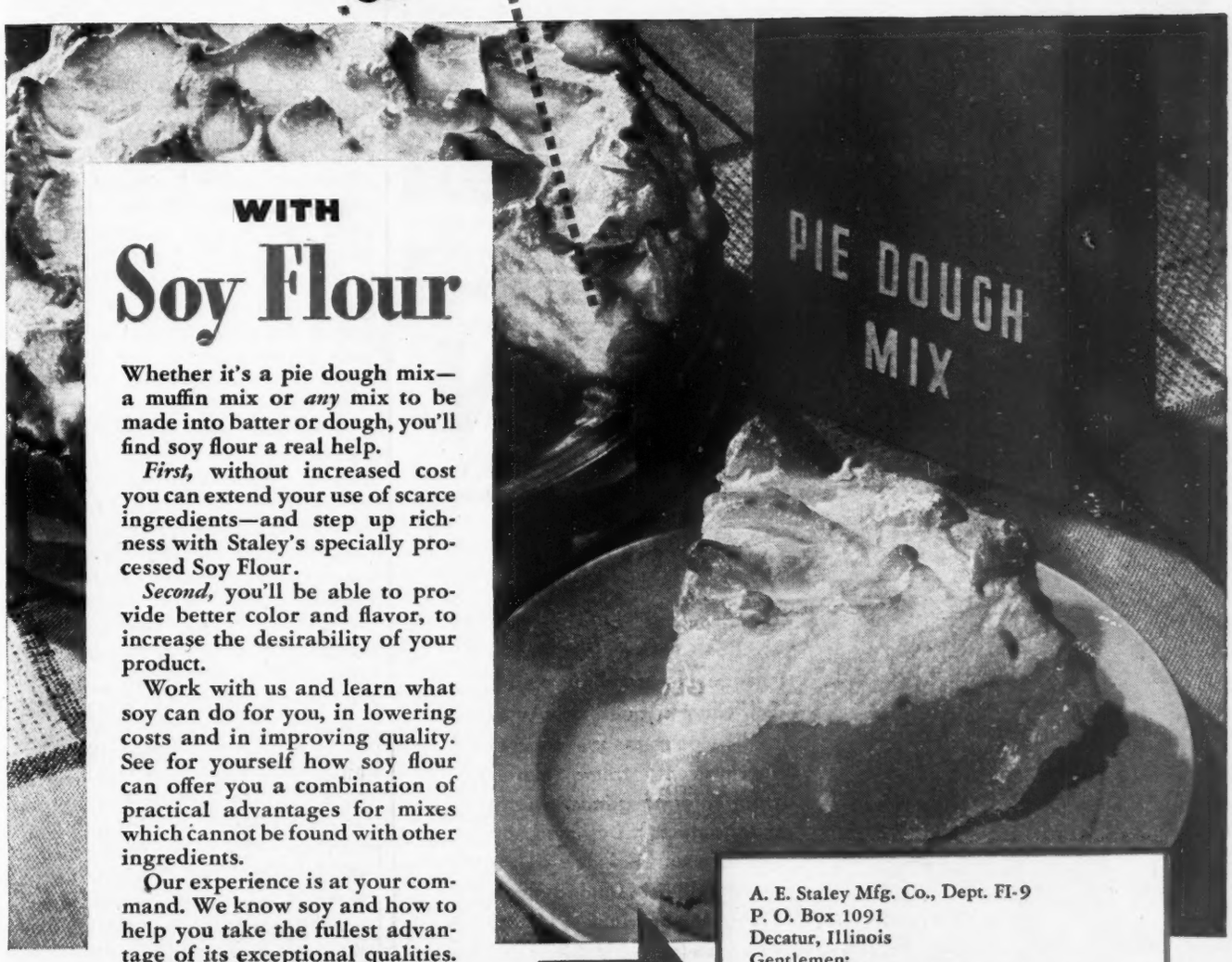
Keeping Quality of Dried Ice Cream Mixes

KEEPING quality of dried ice cream mixes is influenced more by the heat treatment given the serum solids than by temperature of separation or form of fat used. Twelve batches of dried ice cream mix were made from the same lot of milk. The milk was separated at different temperatures to secure cream and skim milk containing various amounts of "agglutinin." The skim milk was forewarmed at 150 and 180 deg. F. and condensed in a stainless steel vacuum pan. Some of the cream was made into butter and butter oil.

Oxygen was absorbed more rapidly, more CO_2 was evolved and more oxidized flavor developed in mixes made with condensed skim milk that had been forewarmed at 150 deg. F. for 20 minutes than in those made with condensed skim milk forewarmed at 180 deg. F. for 5 minutes. No significant differences in oxidized flavor development were observed with mixes made from concentrated skim milk regardless

Give your mixes

Extra flavor extra richness at lower cost



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Gentlemen:
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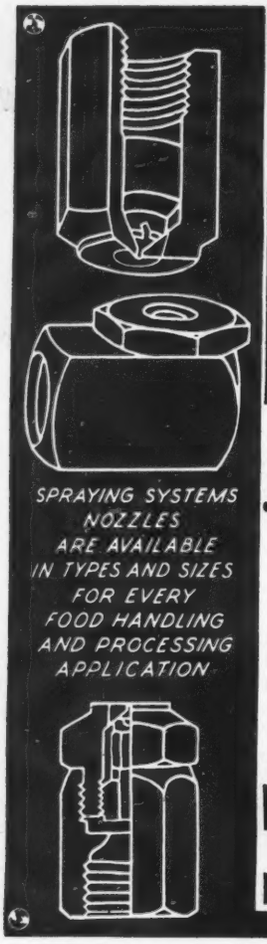
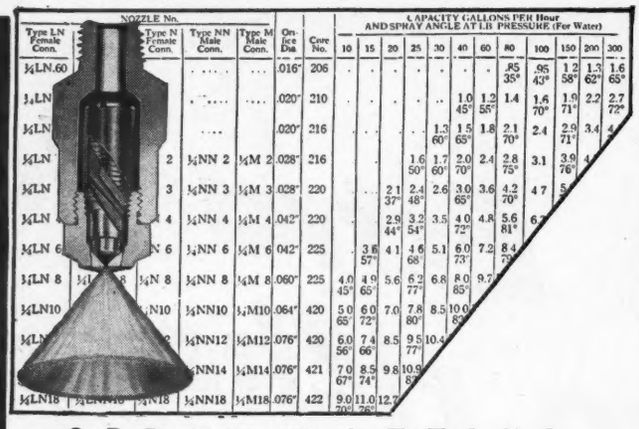


SPRAYING SYSTEMS NOZZLES ARE AVAILABLE IN TYPES AND SIZES FOR EVERY FOOD HANDLING AND PROCESSING APPLICATION



Type LN Female Conn.	NOZZLE No. Type N Female Conn.	Type NN Male Conn.	Type M Male Conn.	Orifice Dia.	Core No.	CAPACITY GALLONS PER Hour AND SPRAY ANGLE AT LB. PRESSURE (For Water) 10	15	20	25	30	40	60	80	100	150	200	300
¼LN.60				.016"	206								.85 35°	.95 43°	1.2 58°	1.3 62°	1.6 65°
¼LN				.020"	210						1.0 45°	1.2 55°	1.4	1.6 70°	1.9 71°	2.2	2.7 72°
¼LN				.020"	216					1.3 60°	1.5 65°	1.8	2.1 70°	2.4	2.9 71°	3.4	4
¼LN	2	¼NN 2	¼M 2	.028"	216				1.6 50°	1.7 60°	2.0 70°	2.4	2.8 75°	3.1	3.9 76°	4	
¼LN	3	¼NN 3	¼M 3	.028"	220			2.1 37°	2.4 48°	2.6	3.0 65°	3.6	4.2 70°	4 7	5		
¼LN	4	¼NN 4	¼M 4	.042"	220			2.9 44°	3.2 54°	3.5	4.0 72°	4.8	5.6 81°	6.2			
¼LN 6	N 6	¼NN 6	¼M 6	.042"	225		3.6 57°	4.1	4.6 68°	5.1	6.0 73°	7.2	8.4 79°				
¼LN 8	¼N 8	¼NN 8	¼M 8	.060"	225	4.0 45°	4.9 65°	5.6	6.2 77°	6.8	8.0 85°	9.7					
¼LN10	N10	¼NN10	¼M10	.064"	420	5.0 65°	6.0 72°	7.0	7.8 80°	8.5	10.0 85°						
¼LN	2	¼NN12	¼M12	.076"	420	6.0 56°	7.4 66°	8.5	9.5 77°	10.4							
		¼NN14	¼M14	.076"	421	7.0 67°	8.5 74°	9.8	10.9 82°								
¼LN18	¼LN18	¼N18	¼NN18	¼M18	.076"	422	9.0 70°	11.0 76°	12.7								

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For food washing, processing, canning, and bottling operations of every type, wherever spray nozzles are required, Spraying Systems spray nozzles are engineered for the job; wide range of sizes permits exact selection to meet all job requirements. Catalog No. 22 will give you the facts.

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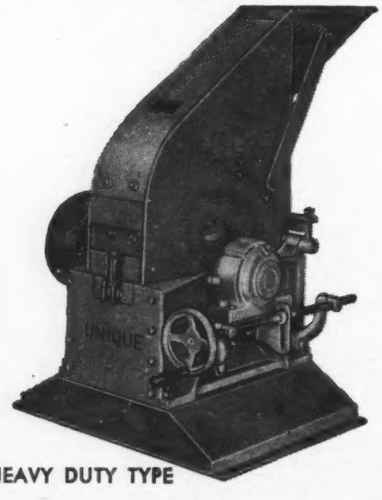

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of whether the milk had been separated at 55 or 130 deg. F. The form of the fat—cream, butter or butter oil—had no influence upon keeping quality. All mixes made from concentrated skim milk forewarmed at 150 deg. F. developed oxidized flavors. After one year, mixes made from condensed skim milk forewarmed at 180 deg. F. had not developed an oxidized flavor and were still palatable.

Digest from "Relation of the Temperature of Separation and the Heat Treatment Given the Skim Milk to the Keeping Quality of Spray-Dried Ice Cream Mix," by H. Pyenson and P. H. Tracy, *Journal of Dairy Science*, vol. 29, 371-379, June, 1946.

FERMENTATION

Yeast From Wood Sugar

YEAST that will grow on pentose sugars, especially those of wood have been much sought after to utilize the sugar remaining after alcoholic fermentation of wood hydrolysate or waste sulfite liquors. *Torulopsis utilis* 3, *Mycotorula lipolytica* P-13, and *Hansenula Suaveolens* y-838 are satisfactory for Douglas fir hydrolysate still waste liquor.

The still waste liquor used contained 3.2 percent total solids, 0.81 percent reducing sugar as xylose. Urea and ammonium phosphate were added. The three yeasts grew equally well, and utilized about 80 percent of the reducing sugar. The ability to use pentoses was shown by addition of arabinose to a spent stillage that had already grown a crop of yeast, whereupon additional yeast could be grown and the arabinose was used up.

Yields of yeast (on dry basis) were 53 to 63 percent of the sugar consumed and compare favorably with the usual yields of *Saccharomyces* yeasts.

In nutritive value the three yeasts were strikingly like brewers' yeast, both in protein content (51.0 to 53.4 percent) and in amino acid make-up. The yeasts were also excellent sources of B vitamins particularly riboflavin, nicotinic acid, pantothenic acid, and *p*-amino benzoic acid. Thiamin values were somewhat low, since the wood stillage medium contained very little vitamin B_1 and yeasts tend to extract the vitamin from the medium rather than synthesize it. They should furnish excellent fodder.

Digest from "Feeding Yeasts from Wood Sugar Stillage," by E. F. Kurth and V. H. Cheldelin, *Industrial and Engineering Chemistry*, vol. 38, 617-619, June, 1946.

News, Advertising, Readership Devoted to Building a Better Civilization

APPROVED FOR UNIVERSITY READING...AND BUYING

The university, college, and secondary school markets are of decided importance to many advertisers. THE CHRISTIAN SCIENCE MONITOR is the daily campus comrade of many young men and women being trained for leadership. This is a section of the MONITOR MARKET that is particularly well worth cultivating today — the large number of veterans giving it added maturity and discrimination.

The director of a university school of journalism says:

"A part of the procedure of the course is to examine, analyze, and report on each of thirty leading newspapers of the country. This year, of a class of about ninety, thirty-two named the MONITOR as the most interesting newspaper they had analyzed. I have a tabulation of the votes in this class that goes back twenty-three years. I find the MONITOR was voted 'most interesting' in seven years, took second place in twelve years, and took third place two years. This means that it appeared in the first three places twenty-one out of twenty-three years."

MONITOR readers are unusually loyal to MONITOR advertising, and their ability to buy is far better than average. Just as they realize they can depend upon the news they read in this international newspaper, they know the advertising is reliable. These factors cause the response to MONITOR advertising to be exceptionally high. You may obtain full details about the MONITOR MARKET at our nearest branch office.—THE CHRISTIAN SCIENCE MONITOR, One, Norway Street, Boston 15, Massachusetts.

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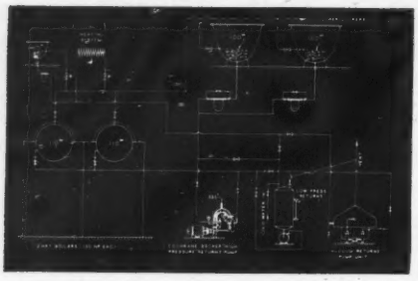
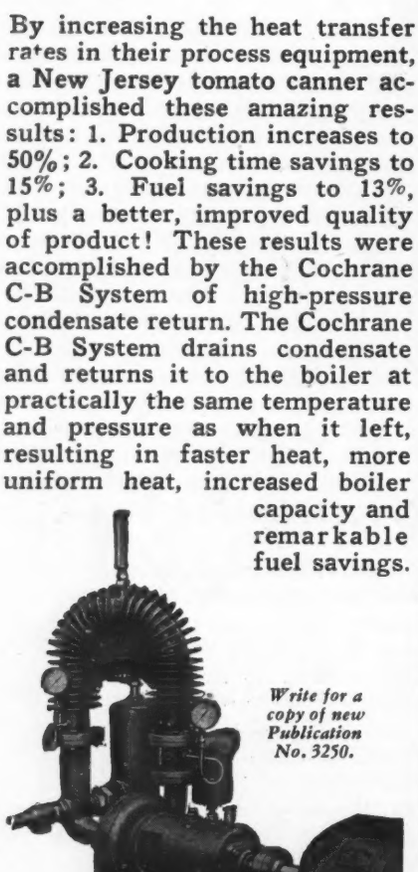
An International Daily Newspaper



INCREASES CATSUP PRODUCTION AS MUCH AS 50% PLUS 15% Saving in Cooking Time and 13% Fuel Saving

By increasing the heat transfer rates in their process equipment, a New Jersey tomato canner accomplished these amazing results: 1. Production increases to 50%; 2. Cooking time savings to 15%; 3. Fuel savings to 13%, plus a better, improved quality of product! These results were accomplished by the Cochrane C-B System of high-pressure condensate return. The Cochrane C-B System drains condensate and returns it to the boiler at practically the same temperature and pressure as when it left, resulting in faster heat, more uniform heat, increased boiler capacity and remarkable fuel savings.



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COCHRANE C-B SYSTEM

CONDENSATE RETURNED TO BOILERS AT HIGH PRESSURE AND HIGH TEMPERATURE

MISCELLANEOUS

Cooking Foodstuff In Sealed Containers

COOKING a foodstuff, enclosed in a sealed, flexible container of thermoplastic film, in a pressure vessel, and then cooling while still under pressure to prevent bursting of the container is the subject of a recent invention.

Fruits, vegetables, meats, soups, seafoods, juices and various specialties, partially precooked, or uncooked, are introduced into thermoplastic bags, together with necessary water and seasoning for cooking. When filled, the bag is closed with an airtight seal, placed in a form-retaining receptacle, which is placed in a steam pressure cooker. The time and temperature of cooking will depend upon the foodstuff to be treated. Packages are cooled by replacing the steam in the cooker with a cooling fluid under pressure. The pressure is maintained until the internal pressure created in the container during cooking has been reduced sufficiently to permit removal from the cooker and receptacle without strain or rupture of the container. Containers must be able to withstand pressures from gases produced during cooking.

Digest from U. S. Patent 2,398,082, issued April 9, 1946, on an application dated October 1, 1943, to Chester J. Cavallito, Rensselaer, N. Y., and assigned to Wingfoot Corp., Akron, Ohio.

Removing Potato Skins

A METHOD for removing skins from potatoes by immersing them in a solution containing 5 to 10 percent NaOH and sufficient NaCl to raise the boiling point to 225 deg. F. or above has been patented.

The previously washed and drained potatoes are fed continuously into an immersion tank through which they are propelled by a rake or conveyor. They are removed from the tank by a conveyor or other suitable lifting device. The excess caustic is drained from the potatoes and the skins are removed by vigorous washing with streams of cold water or by tumbling in a continuous rotary washer. The bath temperature should be maintained in excess of 220 deg. F.

It is claimed that a large saving in caustic will result as against the well known method in which 18 to 30 percent caustic is used.

Digest from U. S. Patent 2,399,282, issued April 30, 1946, on an application dated February 9, 1944, to R. W. Miller and O. W. Andrews, and assigned to Pittsburgh Plate Glass Co., Pittsburgh, Pa.

Frick-Freezer in use by Standard Breads at Auburn, N. Y.

Green Peas - or Any Foods You Want - Are Best Quick-frozen with FRICK Refrigeration and Frick-Freezers

Millions of pounds of fresh foods are quick-frozen every day, in season, with Frick Equipment.

Why? Because Frick-Freezing Systems handle ANY foods, either loose or in boxes, in batches or continuously, with the least effort and with the most dependable results.

Frick-Freezers use a blast of very cold air—down to 60° below zero if necessary. Air at such low temperatures can hold so little moisture, and the freezing is so rapid, that foods retain their original weight, appearance, and flavor most fully when frozen the Frick way.

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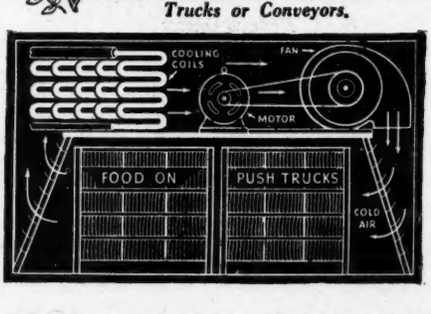
Below: Frick-Freezers Use Either Push Trucks or Conveyors.



BOOKS

Wheat and Enzymes

ENZYMES AND THEIR ROLE IN WHEAT TECHNOLOGY, Edited by J. Ansel Anderson. Published by Interscience Publications, Inc., 215 Fourth Avenue, New York 3, N. Y., 1946. 6¼x9¼ in.; 371 pages; cloth. Price, $4.50.

This is the first volume of a series proposed by the American Cereal Chemists Association to keep its members abreast of developments in fields related to their branch of science.

Enzymes serve as the subject of the first volume because of the important part they play in wheat technology. The book is restricted to a discussion of amylases, proteases, lipases, oxidases and the fermentation enzymes, since these are the ones of greatest interest to the cereal chemists.

There are twin chapters for each of these enzyme classes. The first chapter in each case contains a broader view of the existing knowledge of the enzymes of both plant and animal origin. The second presents a discussion of what is known of the part played by the enzymes in wheat technology. Thus, the second chapter discusses technical applications of the general discoveries revealed in the first.

A cursory reading indicates the method of presentation to be a highly satisfactory one.

Employee Relations

NEW CONCEPTS IN COLLECTIVE BARGAINING. *Personnel Series No.* 97. 47 *pages.* RECONCILING LABOR AND MANAGEMENT PHILOSOPHIES. *P.S. No.* 98. 31 *pages.* CONSTRUCTIVE EMPLOYEE RELATIONS IN UNIONIZED AND NON-UNIONIZED PLANTS. *P.S. No.* 99. 42 *pages.* RATING AND TRAINING EXECUTIVES AND EMPLOYEES. *P. S. No.* 100. 43 *pages. Published by American Management Association,* 330 *W.* 42*nd St., New York* 18, *N. Y. All are* 6x9 *in.; paper covered. Price,* 75 *cents.*

These additions to the American Management Association's personnel series get down to bed rock on the aspects of employee-management relations that are indicated in the titles.

While these publications were prepared by those having a complete understanding of management's problems, there is no evidence of a desire to gloss over the shortsightedness of many industrialists. The pamphlets take a realistic approach to these problems—which cannot be solved by specific rules, certainly not by governmental legislation—and arrive at workable solutions.

Emulsifying Agents

EMULSION TECHNOLOGY. Published *by Chemical Publishing Co.,* 26 *Court St., Dept. JF, Brooklyn* 2, *N. Y.,* 1946. 6¾x8¾ *in.;* 360 *pages; cloth. Price,* $6.50.

This is a second edition in which a new section on the theory of emulsions has been added. The current conceptions of the theory are computed and discussed in detail. The book also includes data on methods of formulation of many practical commercial emulsions in various fields, including food manufacture. It offers a comprehensive alphabetical listing of emulsifying agents in the anion active, cation active, nonionic and miscellaneous categories.

Such chapters as those discussing design of emulsifying machines, and the formulations applying to food products should find ready interest among food processors.

GOVERNMENT PUBLICATIONS

THE following recently issued documents are available at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated the pamphlet is free and should be ordered from the bureau responsible for its issue.

QUESTIONS AND ANSWERS ON GOVERNMENT INSPECTION OF PROCESSED FRUITS AND VEGETABLES. By F. L. Southerland and Elinore T. Linderer. Department of Agriculture, Miscellaneous Publication No. 598. Price, 10 cents.

PRODUCTION OF MANUFACTURED DAIRY PRODUCTS, 1944. Department of Agriculture, Bureau of Agricultural Economics. Unnumbered. Processed.

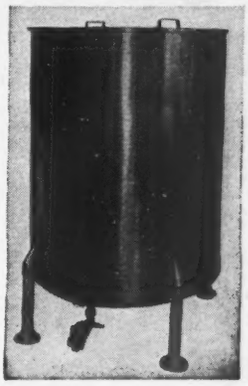
POTATOES. TARIFF COMMISSION. WAR CHANGES IN INDUSTRY SERIES, Report No. 16. Price, 15 cents.

FEDERALLY OWNED PLANTS AND FACILITIES. Senate Document No. 167. A report relative to the continued operation of federally owned plants for processing agricultural commodities and forest products or for manufacturing nitrates for fertilizer.

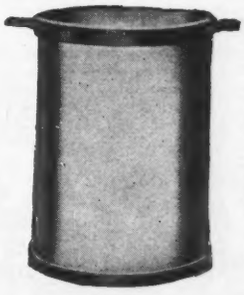
TERRISS

SEAMLESS, STAINLESS

STEELWARE



TANKS: 18-8 Stainless Steel. Highly polished No. 4 finish inside and out. Pitched bottom, self-draining. Stainless Steel covers. Stands pipe leg type. Built-in agitators for fast or slow speed, if desired. 25, 35, 50, 60, 100, 160, 200, 300, 400 and 500 gallon sizes . . . also built to special specifications.



BATCH CANS
Monel metal or stainless steel. Endless iron ring, handles attached, reinforces top. Bottom reinforced by iron cross welded to iron chime. 10 to 75 gallons.

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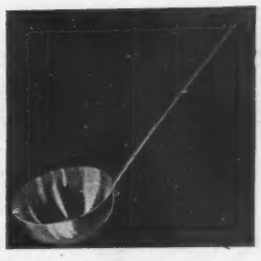

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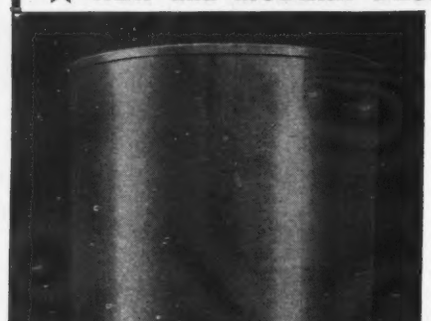

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REACTION OF OYSTERS TO CHLORINATION. By Paul S. Galtsoff. Fish and Wildlife Service, Research Report 11. Price, 10 cents.

PROGRESS IN COTTONSEED QUALITY AND GRADING RESEARCH. By William J. Martin and Henry L. Thomas. Production and Marketing Administration, Department of Agriculture. Mimeographed.

AMENDMENT TO TENTATIVE UNITED STATES STANDARDS FOR GRADES OF FROZEN PEACHES. (Effective June 1, 1946). Production and Marketing Administration, Department of Agriculture. Mimeographed.

CODE OF FEDERAL REGULATIONS OF THE UNITED STATES OF AMERICA. 1944 Supplement. A codification of documents published in The Federal Register. Clothbound. Price, $3.00.

TENTATIVE UNITED STATES STANDARDS FOR GRADES OF CANNED BLUEBERRIES OR CANNED HUCKLEBERRIES. (Effective August 1, 1946). Production and Marketing Administration, Department of Agriculture. Mimeographed.

PRODUCTION OF MANUFACTURED DAIRY PRODUCTS, 1945. Bureau of Agricultural Economics, Department of Agriculture, Mimeographed.

PUBLICATIONS OF THE BUREAU OF DAIRY INDUSTRY RELATING TO BUTTER. Bureau of Dairy Industry. BDIM-INF-40. Department of Agriculture, Mimeographed.

PUBLICATIONS OF THE BUREAU OF DAIRY INDUSTRY RELATING TO EVAPORATED AND CONDENSED MILK. Department of Agriculture, Bureau of Dairy Industry, BDIM-Inf-33. Processed.

ICE CREAM MANUFACTURE. By Alan Leighton. Department of Agriculture, Bureau of Dairy Industry, BDIM-991. Processed.

DRIED ICE-CREAM MIXES. By Alan Leighton. Department of Agriculture, Bureau of Dairy Industry, BDIM-992. Processed.

PUBLICATIONS OF THE BUREAU OF DAIRY INDUSTRY RELATING TO ICE CREAM. Department of Agriculture, Bureau of Dairy Industry, BDIM-Inf-35. Processed.

PUBLICATIONS OF THE BUREAU OF DAIRY INDUSTRY RELATING TO CHEESE. Department of Agriculture, Bureau of Dairy Industry, BDIM-Inf-36.

PATENTS

ENGINEERING

Cereals, Legumes and Like Freed of Heavy Undesired Material by Air Separation During Passage Over Rapidly Reciprocating Wide Perforated Bed and Through Transversely Contracted Passageway—Henry M. Sutton by Frank E. Wood, executor to Sutton, Steele & Steele, Inc., Dallas, Tex. No. 2,404,414. July 23, 1946.

Eggs in Multiples of Six Mechanically Held and Conveyed Past Candling Unit—Ely Bramson, to Bramson Manufacturing Co., Chicago, Ill. No. 2,403,705. July 9, 1946.

Filled Cans With Abnormal Internal Pressures Mechanically Detected and Automatically Removed From Continuous Packing Line—Roy O. Henszey and Paul Smart, to Carnation Company, Oconomowoc, Wis. No. 2,400,507. May 21, 1946.

Fish Flaked in Machine Consisting of Drum Positioned Within and Rotatable in Relation to Second Perforated Drum—Andrew L. Christiansen, Willowbrook, Calif. No. 2,403,910. July 16, 1946.

Fruit Automatically Halved and Pitted in Successive Operations—Norman E. Gaddini, Winters, Calif. No. 2,403,516. July 9, 1946.

Fruit Halved and Pitted by Use of Cutting Disk Having One or More Slots on Periphery to Engage Pits and Remove Them From Fruit Meats—Frank C. Silva, San Jose, Calif. No. 2,404,990. July 30, 1946.

Natural Bond Between Fruit Pit and Fruit Meat Mechanically Broken By Stopping Rotation of Pit As Fruit Rotates About Axis of Pit—Ralph Polk, Sr., and Ralph Polk, Jr., to the Polk Development Co., Tampa, Fla. No. 2,102,181. June 18, 1946.

PACKAGING

Filled and Sealed Paper Bags Containing Flour Wax-Coated in Continuous Mechanical Operation—Edwin F. Anderson, Buffalo, N. Y., to Pillsbury Flour Mills Co., Minneapolis, Minn. No. 2,405,391. August 6, 1946.

Frozen Foods Packaged in Container Consisting of Series of Four Panels Connected to Permit Folding and Formation of Carton Having Sleeves to Reinforce Outer Side and End Walls—Reynolds Guyer and Russell J. Hennessey, St. Paul, Minn., to Waldorf Paper Products Co. No. 2,405,499. August 6, 1946.

Liquids Automatically Filled Into Containers of Various Sizes—Ronald E. J. Nordquist, Maplewood, N. J., to American Can Co., New York, N. Y. No. 2,405,232. August 6, 1946.

Large Pieces or Cuts of Meat Packed In Mold for Quick-Freezing and With Intimate Contact With Inner Surface of Mold Walls—James Arnold Brewster and Enrique Francisco Fernandez, Buenos Aires, Argentina, fifty percent to Smithfield and Argentine Meat Co. Ltd., West Smithfield, London, England, and fifty percent to Corporacion Argentina De Productores De Carnes, Buenos Aires, Argentina. No. 2,402,121. June 18, 1946.

VITAMINS

Fat-Soluble Vitamin Ester Concentrates Obtained From Vitamin-Containing Fish Material by Saponification and Solvent Action—Charles E. Dryden, East Orange, N. J., and Loran O. Buxton, Newark, N. J., to National Oil Products Co., Harrison, N. J. No. 2,404,365. July 23, 1946.

Vitamin A and Vitamin B Concentrates Obtained From Fish Oil By Saponification Preliminary to Extraction and Separation by Highly Polar Selective Solvent—Loran O. Buxton, Newark, N. J., to National Oil Products Co., Harrison, N. J. No. 2,404,618. July 23, 1946.

STARCH and SUGAR

Starch Made Free of Thermophilic Bacteria by Roasting With Initial Moisture Content of Not to Exceed 3 Percent at About 240 to 260 Deg. F. for 1 to 3 Hr.—August J. Bulfer, Berwyn, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,401,813. June 11, 1946.

Stable, Modified Starch Paste Made By Partially Hydrolyzing Starch-Water Suspension and Heat-Treating in the Presence of 0.5 to 25 Percent Water-Soluble Condensate of Urea, Melamine, and Formaldehyde—Silvert N. Glarum, Ardmore, Pa., and Joseph J. Thomas, Portland, Me., to Rohm & Haas Co., Philadelphia, Pa. No. 2,400,820. May 21, 1946.

Sugar Solutions Clarified By Treatment With Hydrogen Zeolite Preliminary to Mechanical Removal of Precipitate and Further Treatment of Juice With Anion Exchange Material—Hilding B. Gustafson, Hinsdale, Ill., and Lewis A. Paley, Glen Ellyn, Ill., to Infilco, Inc., Chicago, Ill. No. 2,402,960. July 2, 1946.

MISCELLANEOUS

Maltose Polymerized by Heating Under Substantially Anhydrous Conditions in Presence of Boric Acid Catalyst—Gerald John Leuck, Evanston, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,400,423. May 14, 1946.

Vegetable and Animal Material Subjected to Influence of Electrical Field and Tension of Not Over Twenty Millivolts During Extraction Process—Charles Reid, Edgware, England. No. 2,400,951. May 28, 1946.

Yeast Cells of 7 to 12 Percent Water Content Coated With Water-Soluble Lignin to Assure High Survival Rate After Rehydration—Eric W. Eweson, New York, N. Y. No. 2,401,819. June 11, 1946.

Artificial Edible Cherries Made From Sodium Alginate—William Julius Syplie Peschardt, Pinner, England. No. 2,403,547. July 9, 1946.

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All McGraw-Hill magazines, with the exception of BUSINESS WEEK, ELECTRICAL MERCHANDISING and SCIENCE ILLUSTRATED, are adopting a standard 8¼x11¼-in. page size starting with this September issue. We regret that the paper shortage makes this change necessary in the course of the year. We should have preferred, for your convenience if you bind the year's issues, that the change be made in January. We are sure, however, your binder will be as willing and able to meet the situation as ours is. The issues September through December can be filled in at the stitching edge so as to equal the remainder of the year in width. The top and bottom margins of the first eight months are sufficiently wide to allow for trimming to the new length. We anticipate that this temporary inconvenience will be more than equalized by the advantage of a standard size henceforth.—THE EDITORS.

Philippine Sugar

(*Continued from page 77*)

precede reconstruction of the mills.

Under the provisions of the Tydings War Damage Act, Filipino and American sugar concerns definitely have big reconstruction funds coming to them. But that money has not been appropriated by Congress as yet. And the Spaniards, who have a large stake in the Philippine sugar industry, will have to dig into their own reserves, mostly held in Spain, if they want to have another crack at the sugar game.

The Bell Bill, in order to become operative, calls for an amendment in the Philippine constitution that guarantees special privileges to American firms operating in the islands after independence. That amendment has not been passed as yet by the Philippine legislature —another reason why American sugar men are standing pat. The Spaniards, who have no special privileges, are wondering how they will fare under the first independent Philippine government since they conquered the Archipelago 400 years ago.

Mill Amalgamation

These nationality problems also have another important aspect. Sugar experts are agreed that the overall inefficiency of the industry is in large measure due to wasteful competition among overlapping national interests in certain planta-

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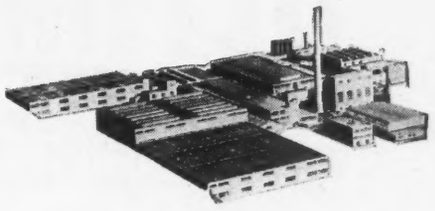

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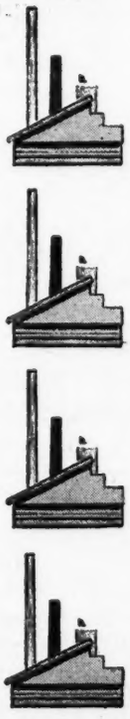

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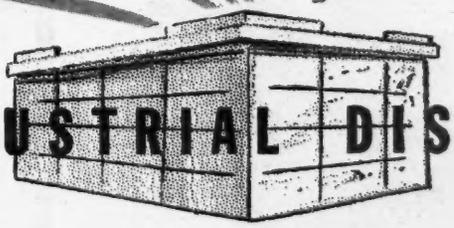

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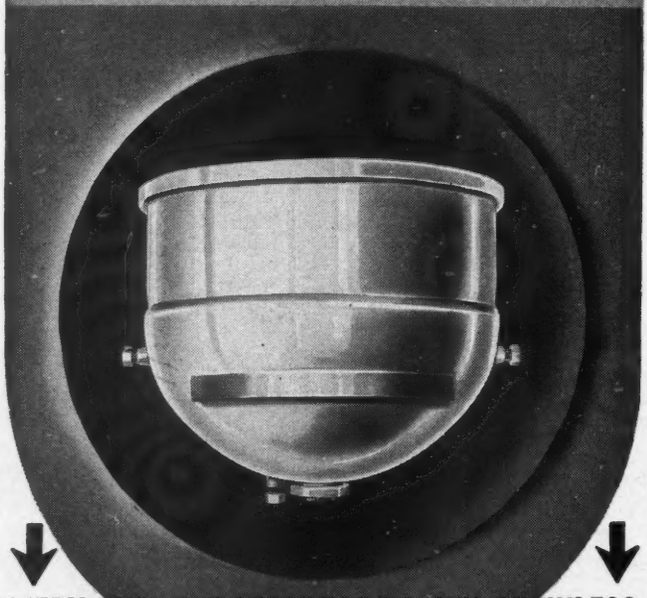

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tion districts. Amalgamation of several low-efficiency centrals is considered a highly desirable step in the direction of cost-lowering rationalization. A reasonable degree of cooperation in reconstruction planning among the three principal national interests involved may also go a long way towards re-establishing the industry without exclusive reliance on Uncle Sam's continued patronage.

Quota in 1949?

Estimates of the rebuilding period required to restore the industry to its prewar status vary from three to five years. If the present inertia can be overcome quickly through speedy settlement of war damages and intelligent government action, it is likely that in 1949 the Philippine sugar industry will be back on its feet. An American official connected with the Philippine Sugar Administration estimated that by next year the Commonwealth will be able to produce enough sugar for its own sugar bowls and that production in 1948 may leave a margin for export equal to half the quota of 850,000 long tons, with full-fledged quota exports in view in 1949.

How far the United States will go in extending a helping hand depends upon the direction of its long term sugar program. There is a growing attitude that it might be economically unsound to help restore the Filipino industry, if it has to be done at the risk of again jeopardizing the more reliable Cuban supply.

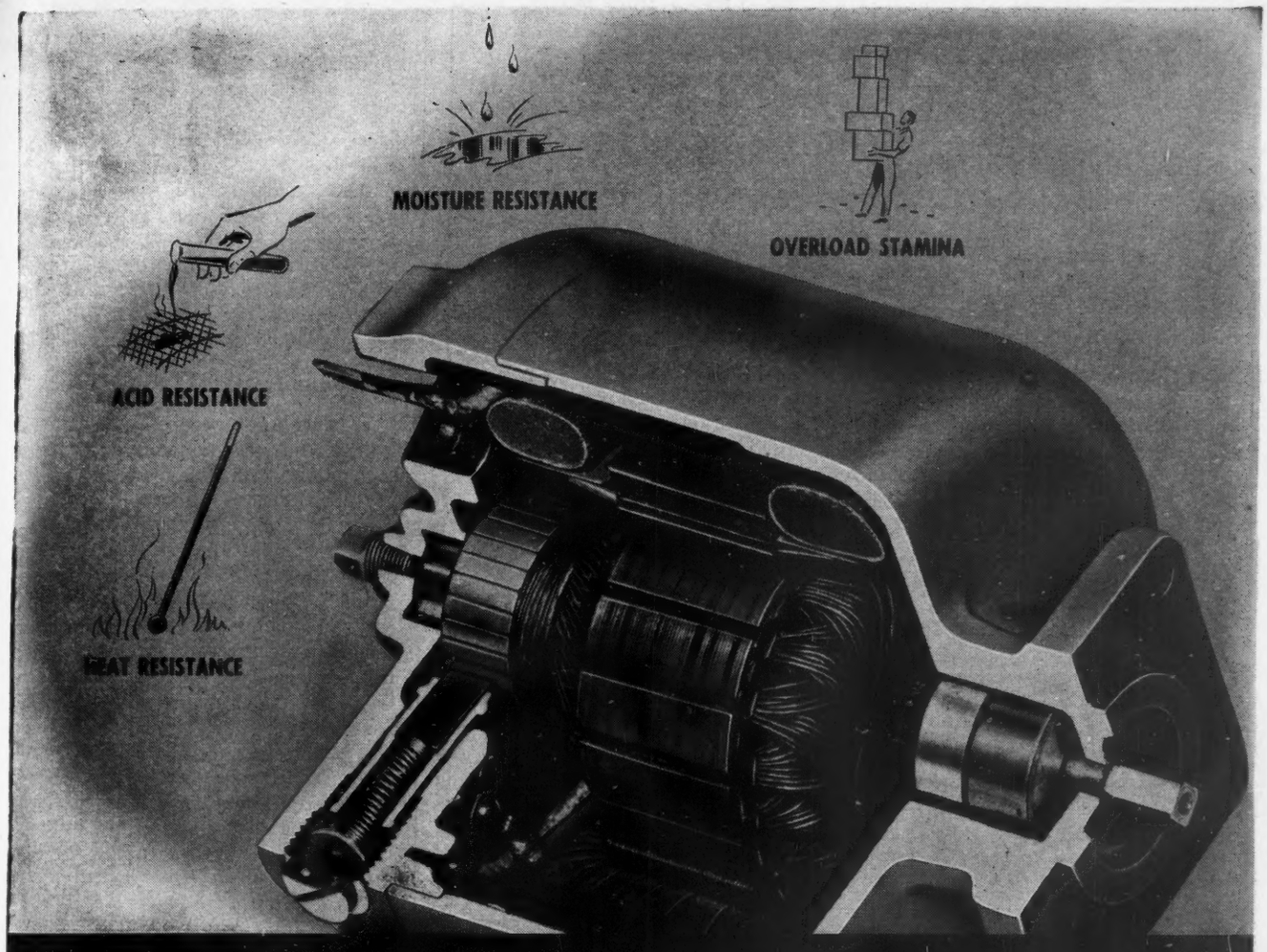
—End—

Portable Container

(*Continued from page* 91)

when a temperature of +23.5 deg. F. was noted in the top of the container along the side. In this section, however, a temperature of +15 deg. F. was observed after 90 hours. Temperatures were lower in the bottom than in the top sections of the container. Lowest temperatures were recorded below the refrigerant bunker.

Over a 90-hour period, temperatures increased from −1 deg. F. to +5 deg. F. in the bottom-side section; decreased from +9.5 deg. F. to 0 deg. F. in the center-side section; increased from +14 deg. F. to +15 deg. F. in the top-side section; increased from −50 deg. F. to −22 deg. F. in the bottom-center section and increased from −50 deg. F. to +15 deg. F. in the top-



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center section. Fillets showed no evidence of defrosting at the conclusion of the tests.

Internal temperatures of frozen meats shown in Table II did not go over +22 deg. F. after six days in a 38-deg. F. cooler. Temperatures of the meats in all five locations were below +10 deg. F. after five days at 38 deg. F. At the end of the test, defrosting temperatures were encountered. In the case of meats, however, defrosting was not encountered.

Summary of Test Results

Frozen fillets and frozen meats were packed in Church containers and refrigerated with about 100 lb. of dry ice. Temperatures were taken periodically inside and outside of the containers. It was found that about 1 lb. of dry ice was required for every 3 lb. of frozen fillets packed in the container and held 90 hours at temperatures ranging from 64 to 77.5 deg. F. A similar amount of dry ice was needed for 3 lb. of frozen meat packed in the container and held 168 hours under conditions simulating distribution. Defrosting temperatures took place after 90 hours in containers with frozen fillets and 7 days with frozen meats.

These containers serve not only for shipping purposes but also as deep freeze compartments until products are available for product storage in cold storage rooms, locker plants or low temperature display cases. Use of the containers is not limited to shipment of frozen fish fillets and meats. They should be suitable for shipping packaged, frozen products, such as fruits, vegetables and precooked foods.

—End—

Statistical Control

(*Continued from page* 106)

A control chart is usually posted near the particular process involved in plain view of the operators of the process, and of course its general meaning and significance are fully explained to the operators. With the proper approach, the operating personnel may take considerable interest in the control program, and may take pride in keeping their particular process in control, which of course helps keep it in control.

It is advisable to keep some sort of record of relevant facts pertaining to the control chart. Sometimes space is provided on the chart for brief notes, or alternatively the quality control engineer keeps a

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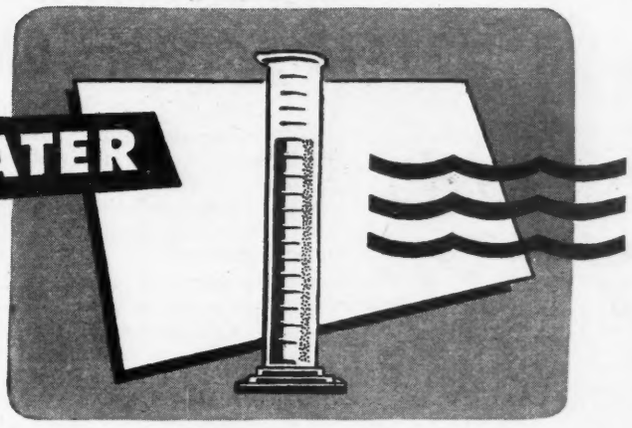

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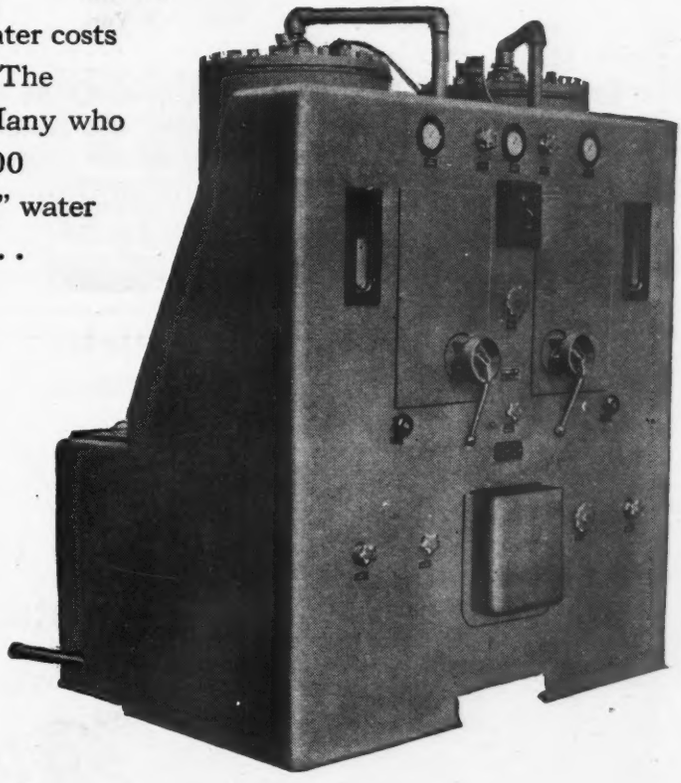

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The Steinlite is ACCURATE . . . calibrated against official oven methods. Built by a pioneer organization of radio engineers. When used by an experienced operator it is "the one minute moisture tester." More in use than all other electric moisture testers combined. Many new uses being found. If you have a moisture testing problem, let us help you solve it. The Steinlite is sold on a FREE TRIAL basis. F.O.B. Atchison, Kansas. Write for catalog.

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SEEDBURO EQUIPMENT COMPANY

Formerly SEED TRADE REPORTING BUREAU FOUNDED 1912

notebook. His notes on a particular process might begin as in Table II. A study of this illustrative example will show that definite results are being obtained. The control band is being narrowed, and in this case there is a gain because the level can be changed to reduce the average amount of overfill per bag. The saving is quite trivial on a single bag, but may amount to several hundred pounds per month. Minor improvements of this kind alone have been found to be sufficiently profitable to pay for a quality control program several times over.

Recommended Reading

Using the foregoing discussion and analysis of sample control charts as a basis one should be able to make the initial start on a quality control program. Those who go into the work will naturally wish to read further on the subject, and will find the following books useful:

W. A. Shewhart, Economic Control of Quality of Manufactured Product, Van Nostrand, New York, 1931

L. E. Simon, An Engineers' Manual of Statistical Methods, Wiley and Sons, New York, 1941

American War Standard Z1.3-1942, Control Chart Method of Controlling Quality During Production, American Standards Association, New York, 1942

—End—

Glass Piping

(*Continued from page* 82)

time the piece should remain in the oven.

A temperature around 500 deg. C. is required for the annealing of thick walled pipe and the rate by which it is cooled should not exceed 25 to 35 deg. C. per minute. This implies that, for glass pipe 2 in. in diameter and $\frac{1}{8}$ in. thick, the cooling period would be about 15 minutes.

Fabricating Special Fittings

In the hands of skilled artisans there is no apparent limit to the complexity of special piping details that may be fabricated. It is estimated that over 3,000 special piping details such as eccentric and concentric reducers, crosses, side outlet tees, offset bends and complex manifolds were used in the fabrication of the piping runs at the Clinton Engineer Works (Fig. 4).

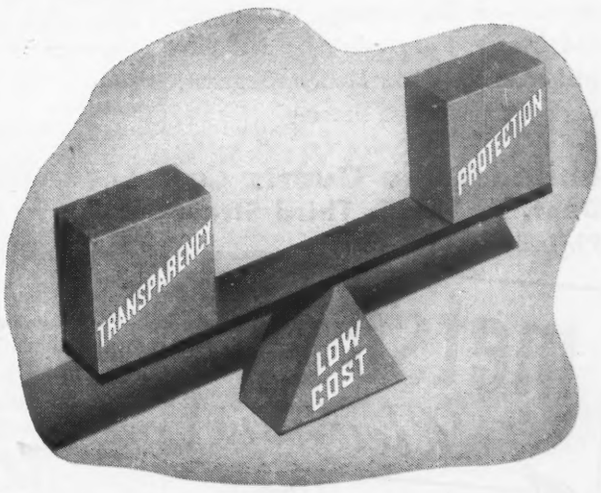
In fabricating the manifold, shown in Fig. 5, over 70 major sequential steps were required. These comprised 35 cuttings to reduce the

Big job ahead for self-service package

ATTRACTING SHOPPERS is the first step in making the *impulse* sales that account for a substantial part of retail store volume. The package must get the shopper's attention . . . tell her all she wants to know. Transparency does this job effectively by making the product its own salesman.

PROVIDING PROTECTION against handling, soilage and flavor-loss often calls for special packaging characteristics. The 56 types of Du Pont transparent films (Cellophane, cellulose acetate and polyvinyl films) are chemically tailored to meet a wide range of protective requirements.

FITTING INTO an economical operation is an important requisite of the effective package. Alert manufacturers are scrutinizing all aspects of marketing costs and looking for the package that will do a merchandising and protective job efficiently and economically.



THE RIGHT BALANCE of packaging factors is available in Du Pont Cellophane. It provides sales-building transparency plus necessary protection—*at lowest cost*. The demand for Cellophane still exceeds the supply, but we hope our converters and ourselves can soon supply all needs.

Write for new booklet, "Design for Selling," a study of consumer buying habits in super markets. E. I. du Pont de Nemours & Co. (Inc.), Cellophane Div., Wilmington 98, Del.

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BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

TALL

SMOKE HOUSE CLEANING • SHORT ORDER FOR

metso

Cleaning smoke house walls several stories high, plus the conveyors and drip pans is a simple task with the Metso solution spray. Carbon, grease, creosote are penetrated quickly and removed in a few minutes. Metso's thoroughness reduces fire hazard.

Packing plants use Metso for its 3-point action — efficient wetting, emulsifying, and dispersion of all dirt. Let a 100-lb. trial order prove how Metso makes short work of smoke house cleaning.

Philadelphia Quartz Co.
Dept. D, 125 S. Third Street
Philadelphia 6, Pa.

section to size or to square the ends. Eighteen separate welds were necessary to assemble the sections into a completed unit. After each section was welded onto the preceding unit section it was necessary to remove the assembly from the sealing jig and anneal the freshly made weld before proceeding with further fabrication. The accuracy attained between the outlets of special fittings approximates that of metal fabrication.

Aligning and Annealing

The success or failure of glass piping installations depends to a great extent on the manner in which it is installed. Care in the selection of the proper type of hanger is important. Equally important is the axial alignment of the pipe flange with the equipment outlet and the careful tightening of the flange bolts. A procedure was developed that resulted in a new solution of some of the commonly encountered construction difficulties. For example, in one case a piece of flanged equipment was removed to a new location and when relocated the outlet flange was 2 in. or more out of axial alignment with the connecting tee some 5 ft. away. Also, the flanges of the tee and the equipment outlet were 8 deg. out of parallel. The piece of equipment protruded through the floor above with the equipment outlet near the ceiling, making accurate measurements difficult to obtain. Freedom from strain in the connecting piping was imperative. After two attempts to fabricate a satisfactory offset piece of the exact length and with the flanges in correct alignment it was decided to try to bend and anneal the connecting pipe *in place!* This novel procedure was accomplished by procuring a piece of flanged pipe slightly shorter than the distance between the flanges of the equipment and the tee, and securing this pipe rigidly to the outlet fitting of the stationary equipment. The other end of this pipe was supported by means of a rope hanging from the ceiling. Two small electric annealing furnaces were suspended in place in such a manner that the heating surfaces were concentric with the pipe. The glass was heated until it showed signs of softening. The pipe was then pushed in the direction of the tee outlet until the flanges were aligned axially. The ring closures were put into place, the gasket inserted, and the bolts drawn up slowly until the flange faces were in intimate contact. When this was accomplished the electric current

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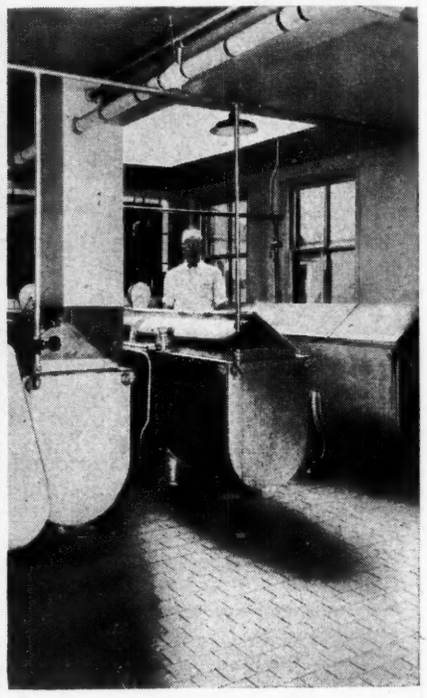
gives FULL PROTECTION against CLEANING COMPOUND CORROSION



Floors, processing equipment, piping, machinery and walls which are frequently cleaned with caustic cleaning compounds can be effectively protected from the corrosive action of the cleaner by a coating of NUKEMITE.

NUKEMITE is a synthetic resin compound which is like a plastic in appearance and like a paint in application. Brushed or sprayed on to a surface to be protected, it rapidly air dries to form an attractive, leakproof and durable film of strong adhesion which is immune to concentrations of all acids, alkalies, salt solutions and most solvents.

NUKEMITE also provides complete protection to all surfaces against moisture and the acids commonly encountered in the Food industry and contained in syrups, sugars, juices, fats, milk, etc.

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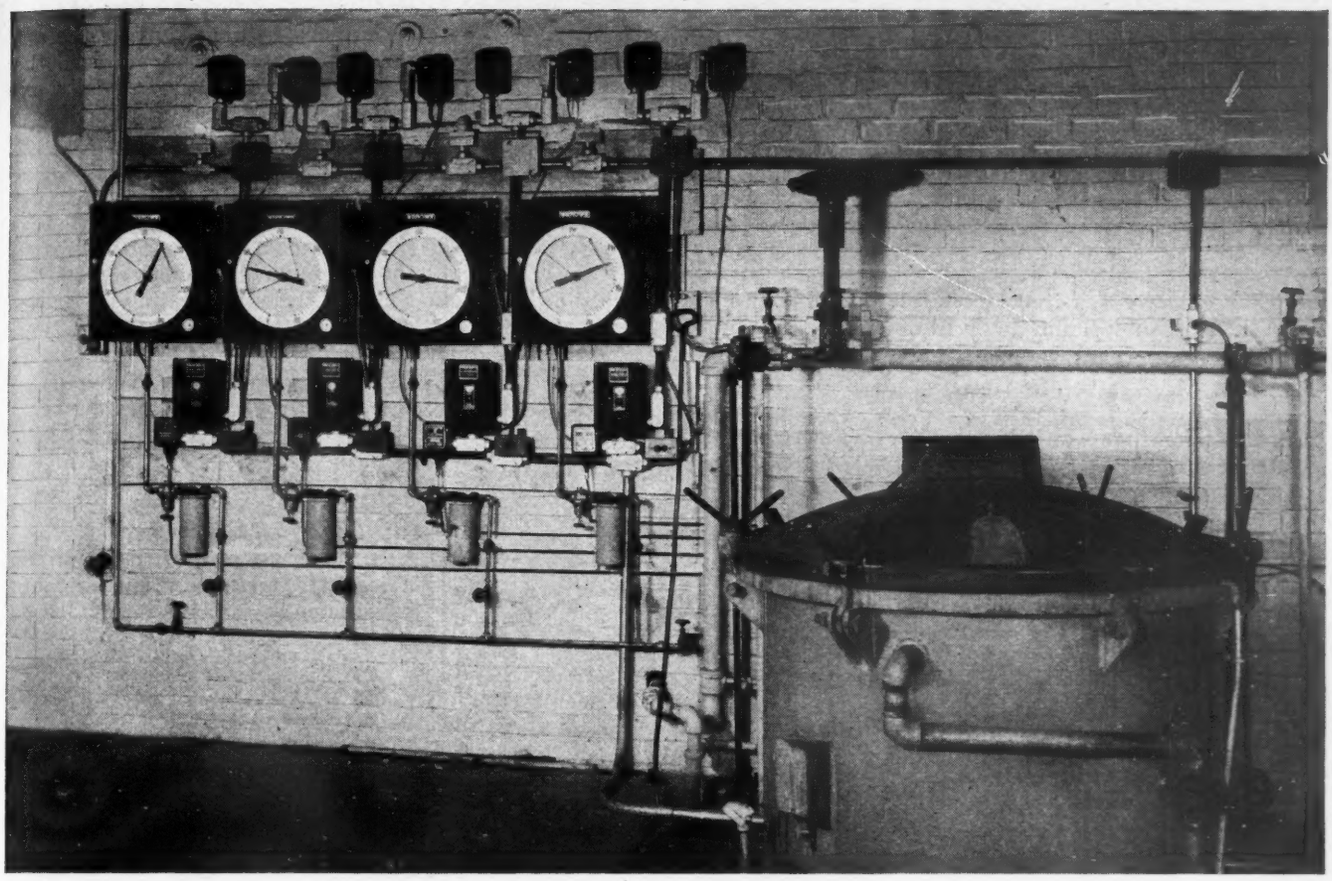

Now, They're Cooking . . . with Electroniks

THIS spotless plant of the Grocery Store Products Co. in West Chester, Penna., is typical of the present trend to modern equipment in the food industry. An example is their use of Brown ElectroniK Potentiometers to control retort temperatures. This instrument offers many advantages over the thermometer type controllers used in the past.

Modern Food Processing Calls for Greater Accuracy and Sensitivity

No longer do food processors want approximate temperatures. Today, realizing the critical nature of temperatures in food processing, they must have the precise temperature for highest quality product and most economical output. The Brown ElectroniK Potentiometer provides greater accuracy, sensitivity and speed of response. It has succeeded in standardizing product quality where other types of controllers have failed.

Convenience in Use

The Brown ElectroniK Potentiometer employs a rugged thermocouple as the temperature sensitive element. This is connected to the instrument by electric wire. The system is simple, easy to connect or disconnect, unaffected by vibration and less vulnerable to damage.

Write for information. THE BROWN INSTRUMENT COMPANY, a division of Minneapolis - Honeywell Regulator Co., 4502 Wayne Avenue, Philadelphia 44, Pa. Offices in all principal cities. Toronto, Canada; London, England; Stockholm, Sweden; Amsterdam, Holland.

BROWN **Electronik** POTENTIOMETERS

A Trend in the Food Industry

MAYBE WHAT YOU NEED IS . . .

a floor that doesn't do a lot of things

For instance . . . that doesn't let cockroaches live happily on it —in fact, they scram away from it.

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Or a floor that won't let molds grow on it—that actually retards bacteria growths to the point that it can be considered an aid to sanitation.

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And a floor that doesn't go to pieces in the presence of neutral oils and greases.

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Or a floor that doesn't soften or disintegrate in the presence of kitchen fats; one that withstands the action of foods which ordinarily play havoc with commercial kitchen floor surfaces.

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Then in flour mills, in plants that produce or use solvents, and anywhere that conditions are conducive to explosions, you want a floor that doesn't spark but which drains away static electricity.

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And of course, a floor that doesn't sacrifice long-wearing qualities for these extra virtues. A floor with the resilience of a fibrous material, but one which will take light wheeled traffic without dusting or cracking.

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We're not claiming the world for Hubbellite. But all these qualities are just as we say. Hubbellite is a cupriferous, monolithic surfacing which can be applied over concrete, or even over wood, if the supporting sub-floor is in sound condition. We have printed matter giving tests made for the check of fungus growths, of roaches around bakeries and of all other features on diverse installations. Write, stating the particular slant you would like to investigate, or ask for complete literature.

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was turned off the furnaces and the pipe allowed to cool. After the annealing furnaces were removed the connecting piece was carefully examined with a portable polariscope and found to be free from strains.

Conclusion

It is evident that on large scale installations many operations, heretofore confined exclusively to the shops of the supplier, may be profitably transferred to the field, and that field welding and fabrication of Pyrex pipe may be considered an acceptable engineering procedure.

—End—

Sanitation

(*Continued from page* 89)

cases, one treatment may remain insecticidally active for three months.

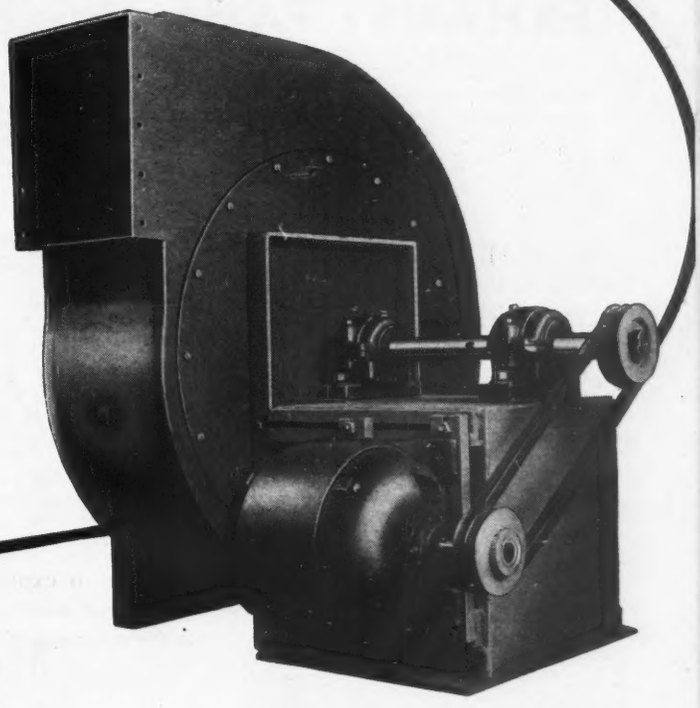
Residual types of insecticides have not been widely used because the interior of the plant must be thoroughly washed down following the treatment. Nevertheless, there are numerous locations, in and around the plant, where wall-washing cleanup is not required. Here, well placed protective films of DDT will do much to reduce the insect populations. Many problems still remain unanswered in regard to the actual toxicity of DDT to man. Correct formulations, the most efficient type of spray applicator and other information are needed before further recommendations can be made in the use of DDT in the inspected establishment.

Poison Baits

Preparation and use of poison baits for rodents must be under supervision of an MID inspector. Red squill and barium carbonate are two approved rodenticides. Red squill, although relatively nontoxic to man and domestic animals, must be used under the same restrictions as the more toxic barium carbonate. Baits must not be placed in edible-products departments until after operations have ended for the day. Strict account must be kept of the location and number of baits set out. All uneaten baits must be gathered and destroyed before the start of the next day's operations. Baits must not be placed in dry-salt cellars. They may be placed in other departments containing exposed meats, but care must be taken that they are selectively placed to avoid contamination of the meat.

Powdered red squill, biologically standardized, is mixed with some

Can Your MATERIALS Be Handled By AIR?



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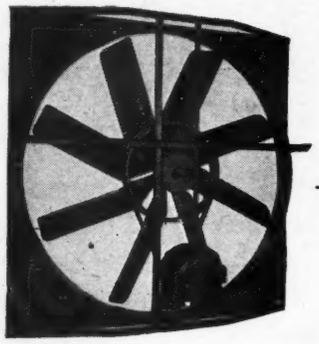

SUCCESSFUL PLANT MANAGERS are realizing more and more the close relationship between employee health and the health of their PROFITS! They know that the best of machinery still needs efficient operators and that only healthy, happy workers are efficient. Adequate circulation of fresh cooling air, they say, is fully as important to worker efficiency as adequate lighting! Plants have been inspected so that "blind spots" in both are eliminated.

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naturally attractive food, in the ratio of one part of red squill to nine parts of bait. Success of poison-bait treatment depends, to a great extent, upon the selection of food bait that rats will eat readily. Rats do exhibit definite food preferences. In some plants a preference is shown for the type of food being processed. In other plants, rats are tempted by foods not ordinarily accessible. Ground fresh beef or canned fish seem to be very attractive to rats. If rats fail to take these types, they can usually be tempted by chocolate, bread, fresh fruit or vegetables.

Trapping

Trapping of rats and flies is practiced as a supplement to chemical control methods. Results from trapping are variable. Usually, large numbers of rats and flies can be destroyed, if trapping is under supervision of a careful workman. There is, however, a tendency to put too much reliance on this method to the exclusion of the more positive chemical methods. Large triggered, snap traps baited with fresh meat, bread or fruit are the most effective traps for rats. Traps should be placed so that rats, running along the floor and walls and behind objects, will pass over the trigger. Conical type, fly traps baited with fresh meat scraps and placed in sunny, wind-protected places will account for thousands of flies each day. Traps must never be placed so that they attract flies to doorways where they might enter the building.

In this discussion of packing house sanitation, it has been stated that sanitation is the application of good housekeeping principles in a good house. But remember, there is no substitute for a *good housekeeper.*

—End—

Managing a Small Plant

(*Continued from page* 72)

associates without losing face, and at the same time, perform a real social service to the individual and to the community.

Every detail of the processing, for which he is responsible, must be thoroughly understood by the boss. This knowledge is necessary from the standpoint of product control as well as product changes, which may be required to accommodate new raw materials or new formulas. Knowing where or when to make a change or an adjustment in a proc-

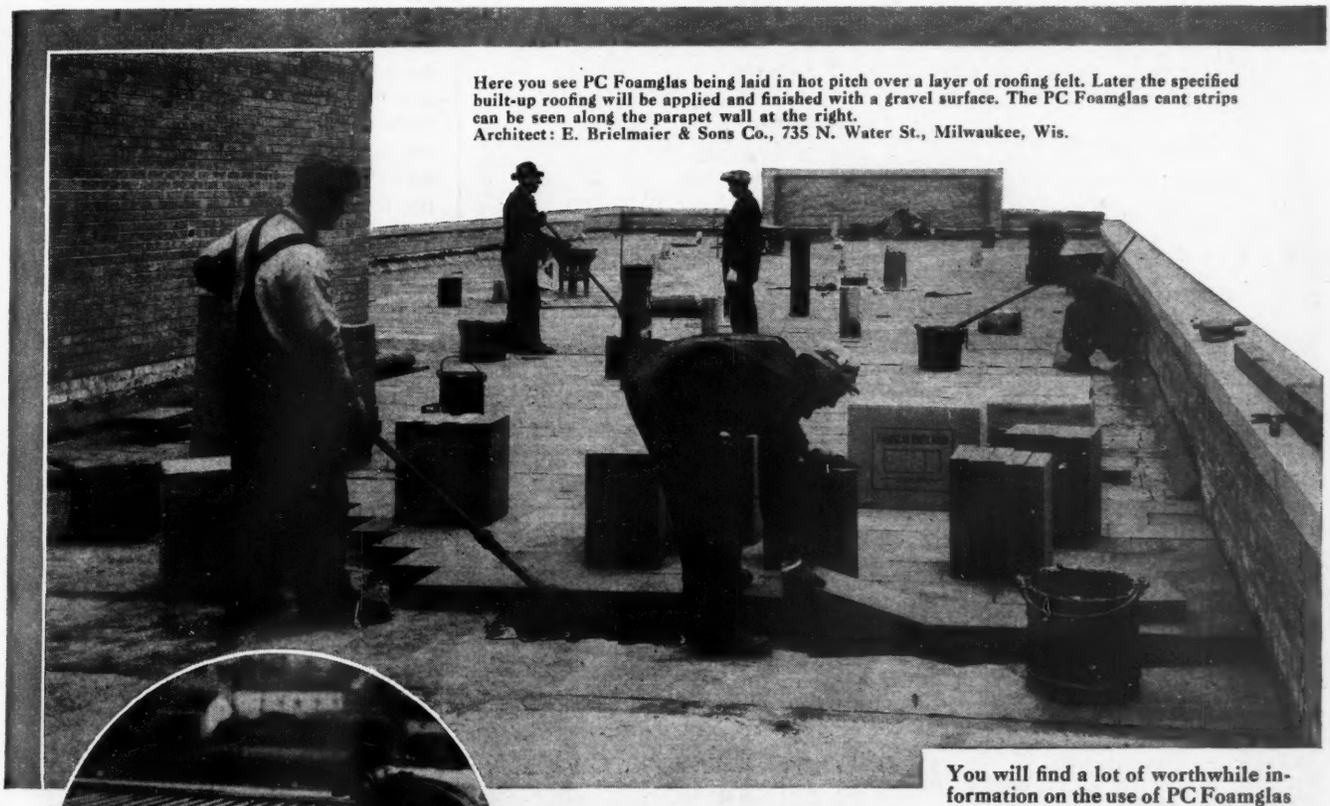
ON JOBS THAT ARE TOO TOUGH FOR OTHER INSULATING MATERIALS . . .

PC FOAMGLAS insulates permanently

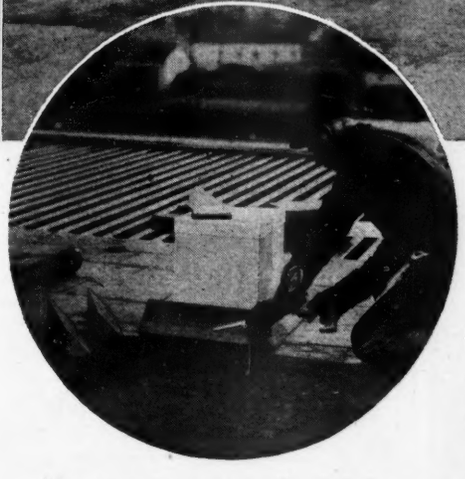
PC Foamglas is not affected by moisture, vapor, vermin, or the fumes of most acids. It is fireproof, waterproof. It does not swell, rot, flake, warp or check. Thus, factors that cause many roof insulation failures do not cause Foamglas to lose its original insulating value.

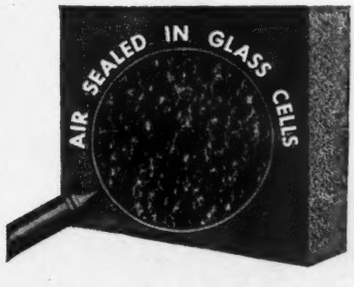
PC Foamglas licks tough insulating problems on roofs, in walls and floors. The big, oblong blocks are light in weight, easy to handle, but still rigid, strong and durable. PC Foamglas stays where it is laid. It does not creep, slip, pack down or powder.

In all sorts of plants all over the country, wherever conditions are really tough, PC Foamglas does an efficient job. It helps to maintain temperature levels, to minimize condensation.



Here you see PC Foamglas being laid in hot pitch over a layer of roofing felt. Later the specified built-up roofing will be applied and finished with a gravel surface. The PC Foamglas cant strips can be seen along the parapet wall at the right.
Architect: E. Brielmaier & Sons Co., 735 N. Water St., Milwaukee, Wis.





Makeshift wooden cant strips have long been a source of roofing trouble. Now you can get cant strips made of PC Foamglas. You need not fear that they will check, swell, shrink or rot.

You will find a lot of worthwhile information on the use of PC Foamglas insulation for specific purposes in our authoritative, illustrated booklets. Send in the convenient coupon for your selection of *free* copies. Pittsburgh Corning Corporation. Room 176, 632 Duquesne Way, Pittsburgh 22, Pa.

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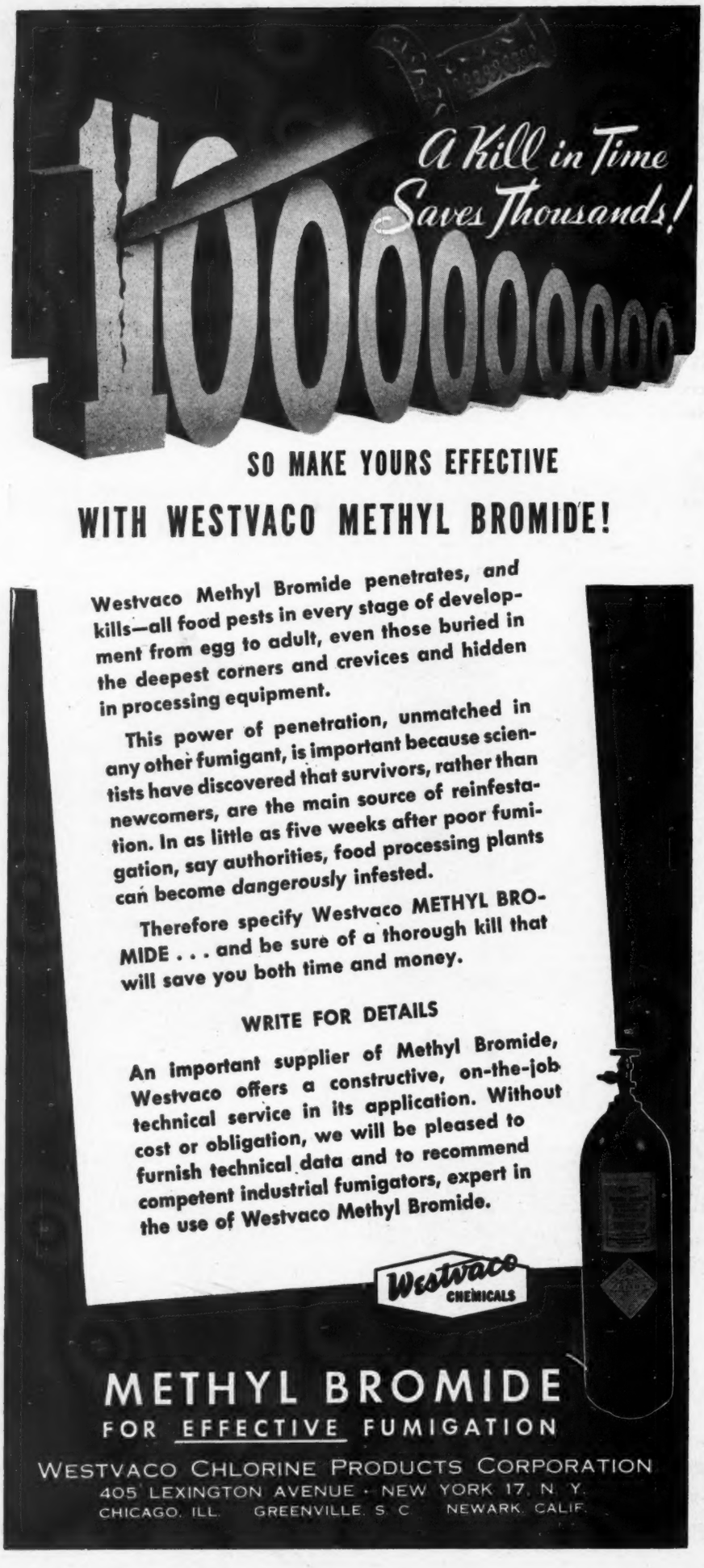
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Westvaco Methyl Bromide penetrates, and kills—all food pests in every stage of development from egg to adult, even those buried in the deepest corners and crevices and hidden in processing equipment.
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ess is most important. He can only acquire such skill by actually working with the product itself. Needless to say, the same familiarity with the manual operation of each machine in the process is essential. The manager should be able to take the place of each operator in his plant. Such versatility is a great morale builder because plant men quickly respect a boss who can operate and adjust their machines.

The manager must know how to conduct simple physical and chemical tests for the purpose of control. Since small plants cannot afford a control chemist, it is up to the manager to have enough knowledge of chemistry to be able to test his raw materials and his finished product. When changes in processing have to be made, results are easier to predict if he knows the characteristics of each one of the raw materials that are being used. Quality controls of the product in process are very important. The manager establishes and maintains suitable production controls that will insure a high quality finished product at all times. Such a program requires both physical and chemical checks, at the most advantageous points, along the line of production.

Mechanical Maintenance

Keeping plant machinery operating at its highest level of efficiency is essential. The manager must be familiar with all forms of mechanical maintenance. Too often this phase of plant operation is neglected because the budget cannot afford a full-time mechanic. Even the simplest machines fail when they are allowed to get out of adjustment or run dry from lack of lubrication. The manager must personally supervise the mechanical maintenance program and check to see that it is carried out. The actual work is usually assigned to the highest ranking process operator. All machines have parts that wear out under normal conditions of operation. Spare parts must be carried in reserve to avoid costly shutdowns. Actual operating experience with the machines themselves best determines the parts that need checking and replacing.

It is the manager's duty to be constantly on the alert to protect the lives of the workers and the property of the company. The very latest safety devices should be installed on the machines. First aid equipment and emergency medical service must be available at all times. Every effort must be made to see that the safety equipment is being properly used.

What you can't see can hurt you!

G-E GERMICIDAL LAMPS PROTECT AGAINST THE INVISIBLE CAUSE OF CONTAMINATION LOSS

Unseen, microscopic bacteria or mold spores often are the cause of food spoilage that absorbs processors' profits.

You can protect your operation against these losses and insure customer good will by installing G-E Germicidal Lamps. Ultraviolet radiation from these new lamps kills bacteria and mold spores in the air, permitting only purified air to come in contact with the food product.

Firms already employing G-E Germicidal Lamps have experienced marked reductions in spoilage with consequent increased profits.

G-E Germicidal Lamps Protect Handlers of:

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- Beer

Superior Food Products of Los Angeles uses G-E Germicidal Lamps to protect their products from spoilage.

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ENGINEERED STEAM
. . . FOR FOOD PROCESSING PLANTS

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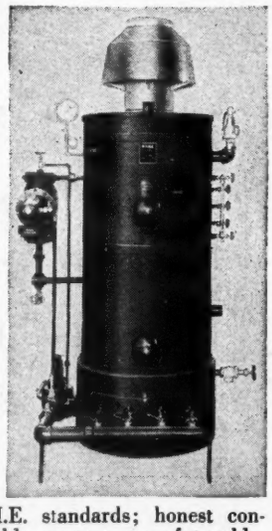
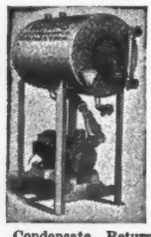
2. **EFFICIENT CONTROLS**
3. **MKO AUTOMATIC BOILER FEED**
4. **EXPERIENCE**



The outgrowth of 40 years' design and construction, the KANE, automatic, gas-fired boiler, built in sizes up to 30 H. P., supplies steam of maximum cleanliness. Efficient controls insure safety and maintain precise temperature needed. Condensate is returned automatically by the MKO boiler feed. Our experience enables us to judge the equipment best suited to the particular requirements of your plant.



Condensate Return System. Automatically returns hot condensate and adds needed make-up water.

Engineered Steam complies with A.S.M.E. standards; honest construction and the best materials obtainable mean years of trouble-free service.

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Manufacturers of Automatic Steam Boilers for over a third of a century.
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The property of the company must be protected by installing suitable fire fighting apparatus, sump pumps and burglar alarms. This equipment should be frequently checked and maintained at highest efficiency.

Cleanliness is the primary law in a food plant. The production schedule must be adjusted to provide for ample time for cleaning and sterilizing. Foreign matter must be prevented from accidentally getting into the product. Clean and attractive uniforms should be supplied to the employees. State health laws for food plants must be rigidly enforced and supplemented by specific plant regulations.

Liaison Agent

The branch plant manager has a responsibility not only to the men who work for him, but also to those for whom he works. Operating reports of his plant, which are of prime importance to the main office, must be submitted at regular intervals. The policies, which have been established by his superiors, must be adapted to his organization. As a liaison agent, he must be able to understand the problems of both top management and labor, and to strike an harmonious balance.

From the above description of the functions of the manager of a small plant, it would seem that only a superman would be able to fill the job. Each one of these functions is present to some degree in every plant. The amount of effort required to perform them will vary with the type of plant, with the importance placed on each function by the man in charge, and with the company standards of excellence. The running of a small plant is not as simple a job as many in top management are prone to believe. Because a plant is small, there is no reason to believe there is little or no supervisory work required to keep it going. On the contrary, the small plant has the same type of problems as the large one. In this case, however, the problems must be met by one man relying on his own resources. He must be a veritable "jack of all trades." While he may not be a master of all of them, nor a miracle man, he must have, at least, a practical working knowledge of most of them. Like the country doctor, who also must be prepared to meet all kinds of cases and emergencies, his reward is often the satisfaction of "a job well done."

What kind of a man does one find in such a position? Technical ability together with executive talent goes a long way toward the making

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of a manager of this type. Persistence in the face of difficulties will keep him on an even keel when he has to go it alone. His personality and sense of humor will be reflected in his fellow workers who look to him for encouragement and guidance. If he possesses integrity and an appreciation of his associates, they will respect his position. His problems will become their problems and they will support him with enthusiasm and teamwork. The challenge of the small plant lies in the versatility and the adaptability of the man who can operate it successfully.

—End—

Films and Foils

(*Continued from page* 99)

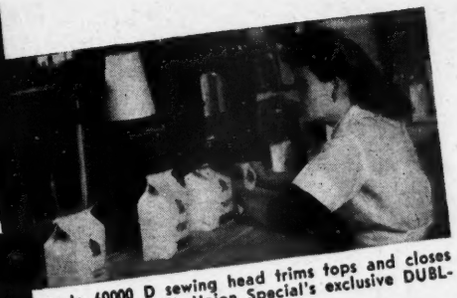
and for use as windows in bags, envelopes and cartons. The cellulose plastic films are not degraded by water. Although they become plastic at heat-sealing temperatures, they can be sealed more easily by means of solvent cements. Interesting tests have been conducted using cellulose acetate as a wrapper for lemons and avocados. The use of cellulose plastics for such applications is very limited. Important uses include laminations and decorative wrappers for candy or luxury food items. Cellulose acetate comprises the bulk of the cellulose plastic food wrappers. Cellulose aceto-butyrate, however, offers superiority in most properties and is gaining recognition. The greatest use of ethyl cellulose for food packaging is in the form of a container or snap-on cover rather than as a wrapping material.

Waxed Papers

Waxed papers are well known throughout the food industry and will continue to be the economy wrapper of a multitude of food products. Opaque and partially transparent waxed wrappers are widely used by bakeries, especially on breads, specialty breads, cakes and rolls. Some creameries are using wet waxed papers in place of regular parchment on their automatic butter-wrapping machines. The wax used to treat the paper can be modified to provide low temperature flexibility and a seal for packaging frozen foods. Considerable quantities of waxed papers are used throughout the meat-packing industry for fresh and frozen meats.

Many types of waxed papers are produced. Sulphite, sulphate, parchment and glassine papers are treated with wax in a variety of ways.

BEANS?

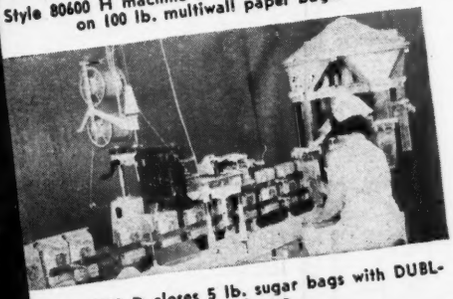


Style 60000 D sewing head trims tops and closes paper bags with Union Special's exclusive DUBL-TAPE closure.

STARCH?

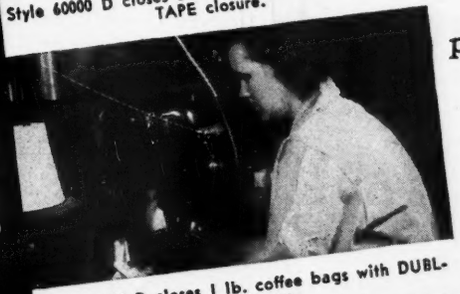
Style 80600 H machine makes tape bound closure on 100 lb. multiwall paper bags.

SUGAR?



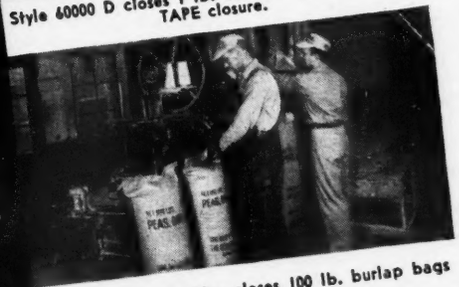
Style 60000 D closes 5 lb. sugar bags with DUBL-TAPE closure.

COFFEE?



Style 60000 D closes 1 lb. coffee bags with DUBL-TAPE closure.

PEAS?



Style 14500 H machine closes 100 lb. burlap bags containing split peas.

DOG FOOD?

Style 60000 D applies DUBL-TAPE closure to paper bags containing dog food.

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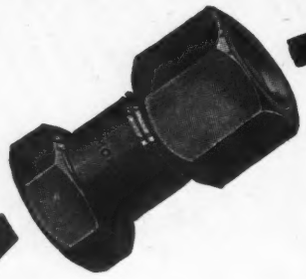

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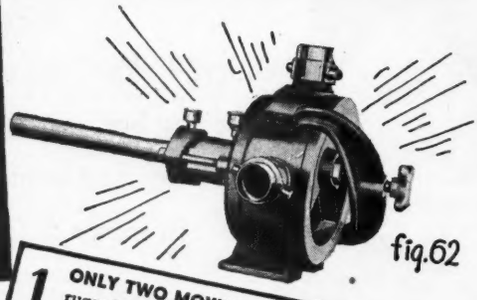

fig. 62

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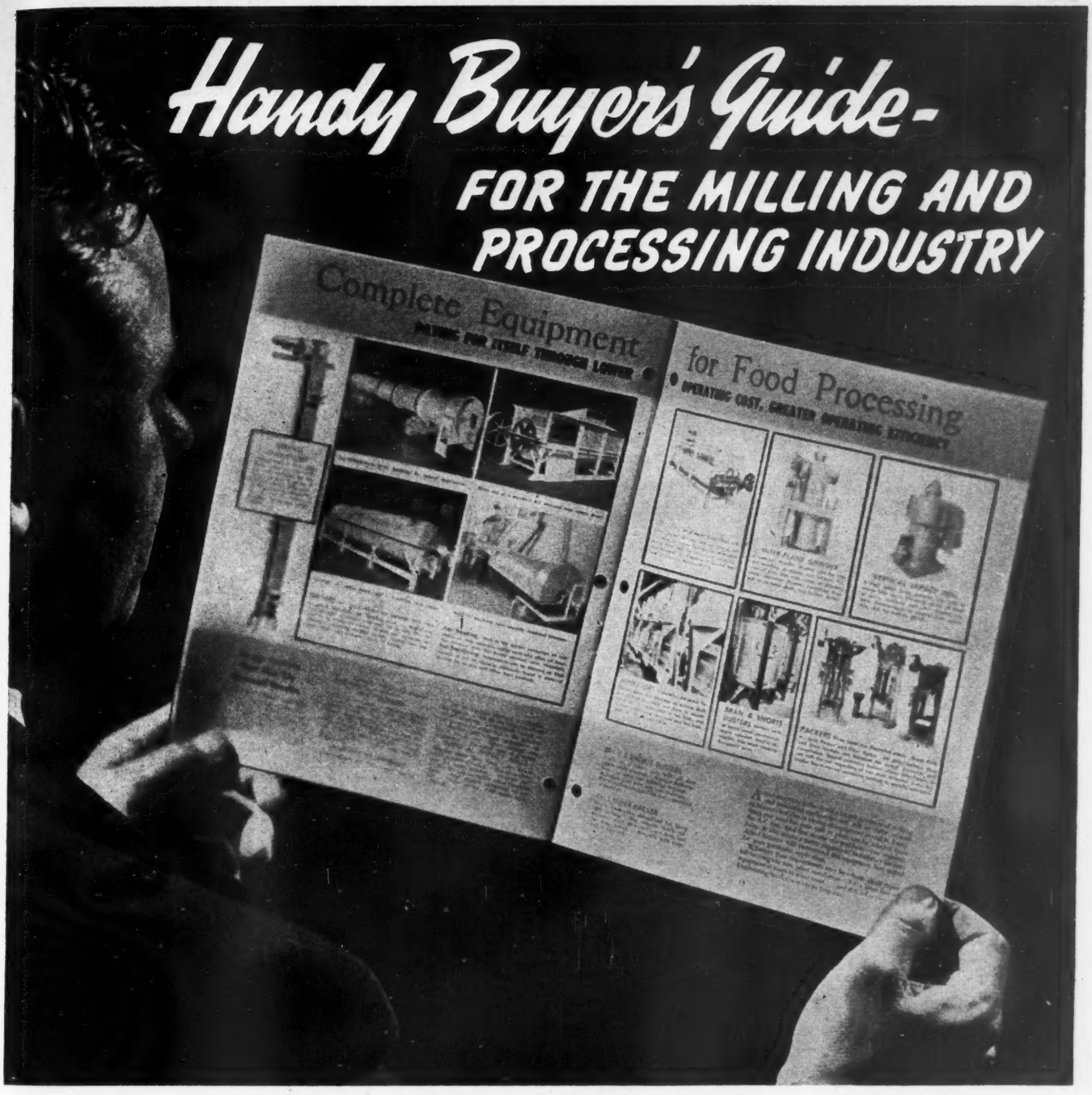
The quantity of wax applied can be carefully regulated. It can be placed in the sheet or on one or both surfaces. Wet-waxing is the term generally used for surface coating. The common method is to run the sheet in a bath of cold water immediately after treatment before the wax has had time to wick into the paper. The greatest developments in the field of waxed papers will be improvements in wax blends, incorporation of synthetic plastics and modifications in methods of application. Although this material may lose much of its market to the fancier wrapping materials, it will get many accounts that were considered poor prospects prior to World War II. Of course, there are many applications for waxed papers where the fancier films are totally unsuited.

Plastic Coated Papers

Basic research in plastic coated papers received tremendous impetus with our entrance into the war. With the occurrence of immediate shortages in critical packaging materials, it became necessary to produce packages that were satisfactory substitutes for tin and glass containers. Coatings first applied to sheets were of a nitrocellulose nature. Later polyvinylchloride, polyvinyl acetate and butvar coatings were tested. All of these coatings were unsatisfactory from a water-vapor resistance standpoint. Cost of production was high. No one plastic coating was found best. It was necessary to try combinations of various plastics. Plastic coated papers were produced, however, which were waterproof, greaseproof and capable of being heat-sealed. Greater use was made of the heat-sealing property than of any other single feature.

Today there are few instances where plastic coated papers have been accepted in commercial packaging. Many new applications will be found in the future. Such features as durability, waterproofness, good heat-seals, greaseproofness and eye-appeal are promised. Considerable work remains to be done before the most efficient method of applying the coating is developed. The coating engineer and the plastic-formulation chemist are working together. Plastic coated papers, in due course of time, should find a market for tight-wrapping set-up boxes and filled and sealed folding cartons.

Rubber-hydrochloride films, more commonly known as Pliofilm, have been used in the packaging of a



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multitude of food products. Use of Pliofilm has been almost as widespread as cellophane. It has a low moisture-vapor transmission rate, does not absorb water, resists tears and punctures, is pliable, can be heat-sealed and possesses transparency. Some perishable fruits and vegetables, meats, fish, cheese and frozen foods have been successfully packaged in this wrapping material. Its advantage over cellophane is its uniformly low water-vapor permeability, despite rough handling. On the other hand, it is not as free from odor as cellophane, and tends to disintegrate when stored in sunlight.

Cry-o-vac bags made of latex have been employed specifically for packaging such frozen foods as poultry, meats and fish. Its protection to frozen products is well known from the standpoint of its close adherence to the products and its ability to prevent freezer burn. About the only improvements that could be expected are increased transparency and greater resistance to puncture by sharp bones.

Basis Weight Papers

The basis weight papers will continue to be very much in demand for wrapping purposes as well as other uses. Relief from the heavy military demand on kraft paper should permit this general store wrapper to become more available. The multiwall bag industry should be in a position to discover additional applications to include bulk and unit size packaging of many foodstuffs in addition to flour, sugar and similar commodities. The parchment papers, glassines and other specialty wrappers are being improved to wrap foods requiring special materials. Improved wrappers are being developed by the use of new coating and laminating compounds.

Future Outlook

The overall picture of the manufacture of wrapping materials is good. Wrappers, developed during the war era, are being applied to foods. This application results in better quality production and extended shelf-life. Food manufacturers are placing more emphasis on packaging, requesting packaging materials to meet their specifications and conducting laboratory performance and field tests before placing orders. New wrappers are constantly being developed with many superior qualities. The supply of critical raw materials will become progressively better as the initial demand levels off. Labor

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troubles and strikes will interfere with the supply of certain papers and raw materials until settlements are made. A very healthy era in the growth of food packaging lies ahead and presents a real challenge to the manufacturer of wrapping materials and the food packaging specialist.

—End—

Preserve Stock

(*Continued from page 75*)

References

1. E. L. Moore, W. B. Esselen, Jr., and C. R. Fellers, Factors Responsible for the Darkening of Packaged Orange Juice. *Fruit Products Journal*, 22, 100-102, 1942.
2. H. S. Beattie, K. A. Wheeler and Carl S. Pedersom, Changes Occurring in Fruit Juices During Storage. *Food Research*, 8, 395-404, 1943.
3. H. H. Moon, C. W. Culpepper and J. S. Caldwell. Varietal Suitability of Peaches for Preserves Making and Factors Affecting the Quality of the Product. *USDA Cir.* 375, 1935.
4. Varietal Adaptability of Strawberries to Preservation in Sulphur Dioxide-Calcium Solution. *Fruit Products Journal*, 23, 5-9, 25, 27, 29, 46-51, 1943.
5. M. A. Joslyn, Color Retention in Fruit Products. *Industrial & Engineering Chemistry*, 33, 308-314, 1941.
6. V. L. S. Charley, D. P. Hopkins, M. E. Keiser and V. E. Sills, The Large Scale Preservation of Plums by the Sulphur Dioxide Cold Process. *Fruit Products Journal*, 22, 362-367, 1943.
7. C. J. Stout, Frozen Strawberry Preserves. *Southern Canner and Packer*, 7, 13, 18, 21, 1946.
8. R. E. Cox, Something New in Frozen Foods. A Frozen Fruit Product for Household Jelly and Jam Making. *Fruit Products Journal*, 24, 169, 187, 1945.
9. A. Crang, M. Croxall, D. P. James and M. A. Sturdy. A Comparison of Methods of Preserving Fruit. *Fruit Products Journal*, 25, 143-146, 153, 155, 1946.
10. A. Maerz and M. R. Paul, "A Dictionary of Color." McGraw-Hill Book Co., Inc., 1930.

—End—

Cooling Towers

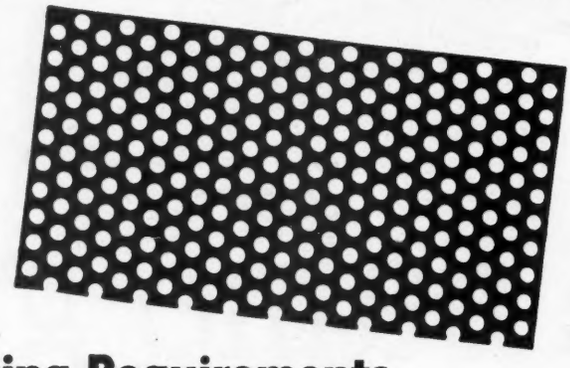
(*Continued from page 96*)

of the new service. The loading intensity is then plotted, or tabulated, against the computed decks, and the loading is selected that corresponds to the actual number of decks in the tower under consideration. The following example will illustrate the method.

Example 3—The tower of Example 1 is to be used to cool water under the temperature conditions of Example 2c. The broadside wind is 4 m.p.h., and the wet-bulb temperature is 70 deg. F. Compute (a) the flow over the tower in g.p.m. and (b) the amount of condensate per hour and the probable vacuum for operating vacuum pans and condensers with a tower under these conditions.

(a) $T_2 = 100$ deg. F.; $T_1 = 76$ deg. F.; $V = 1.10$; wet-bulb = 70 deg. F. From Fig. 3, $C_2 - C_1 = 14.8$. Then, from Equation (2), $N = 14.8 \times 1.10 \times r/m$, or $N = 16.2\ r/m$. The tower

MATCHING SCREENS



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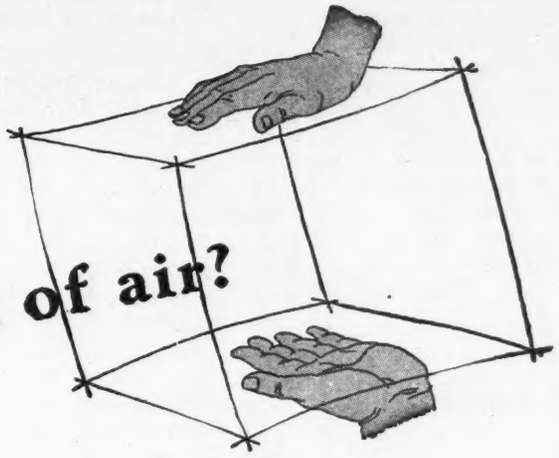

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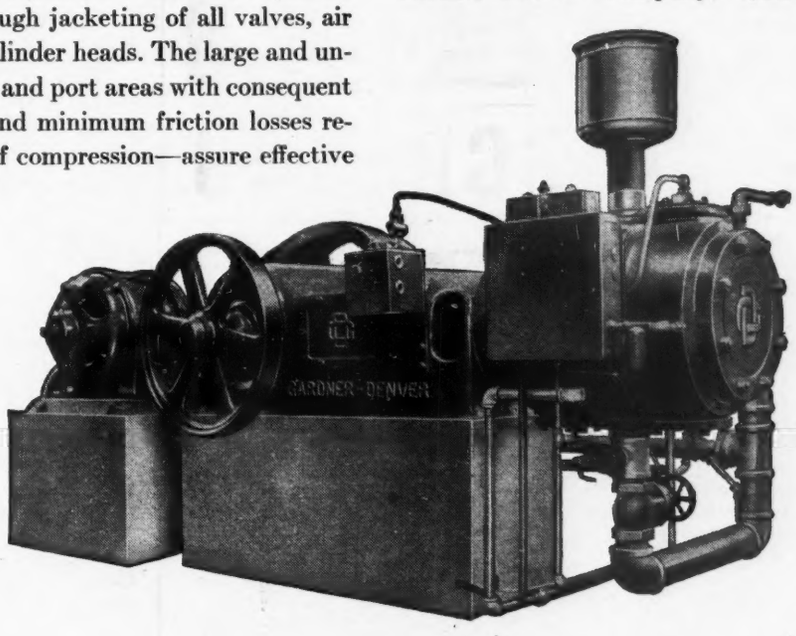

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width is 10 ft., and the 24 decks are spaced at 12 in. centers vertically. A table is set up for various values of the loading intensity, F. Values of r and m are taken from the alignment charts shown in Figs. 4 and 5.

Interpolation in Table IV indicates a loading of 1.33 g.p.m. per sq. ft. of active area. Since the tower area is 100 × 10, or 1,000 sq. ft., the tower will handle 1,330 g.p.m.

(b) Boiling in the open usually results in caramelization of the sugars[5d] in the liquid undergoing concentration, and in excessive loss of flavor by evaporation and decomposition during the heating. If the atmospheric pressure is reduced by placing the liquid under a vacuum, the boiling point of the liquid is reduced, and much of the harmful effect of the high boiling temperature is avoided. One real advantage incident to the use of vacuum is that the boiling point of the liquid is reduced, thus increasing the temperature differential between the liquid and the condensing steam used for heating. Since the rate of heat transfer in boiling increases with increased temperature differential, evaporation is accelerated.

Due to the presence of dissolved solids,[5d] sirups boil in vacuo at temperatures somewhat above those given for water. With a direct-contact condenser of the barometric type, the water from the condenser to the cooling tower will run from 8 to 12 deg. F.[11] below the temperature of the boiling point at the pressure in the vacuum. The temperature of the water entering the condenser from the tower is 76 deg. F. Assuming a differential of 10 deg. F., the temperature corresponding to the vacuum would be (100 + 10), or 110 deg. F. The corresponding vacuum in inches of mercury would be 27.3.

Let

w_s and w_w = The respective weights of exhaust steam condensate and water flowing through the condenser in a unit time, lb.

h_s = The heat content of exhaust steam into condenser, B.t.u. per lb.

t_s = The temperature of the exhaust condensate corresponding to the temperature at vacuum pressure.

Then,

$$\frac{w_s}{w_w} = \frac{h_s - T_2 + 32^{11}}{T_2 - T_1} \quad \ldots\ldots\ldots\ldots (4)$$

Under the conditions of the problem, T_2 = 100 deg. F.; T_1 = 76 deg. F.; and h_s = 1109 B.t.u. per lb.

$$\text{From Equation (4), } \frac{w_s}{w_w} =$$

$$\frac{1109 - 100 + 32}{100 - 76} = \frac{1041}{24} = 43.4$$

Then, with a water flow over the cooling tower of 1,330 g.p.m., the steam condensed would be 1,330/43.4 = 30.6 g.p.m. This figure represents 30.6 × 8.33 × 60 = 15,300 lb. of condensate per hour. The condensing rate will not be constant over a batch cycle; but the example gives an instantaneous rate for the thermal conditions of the problem.

Losses of Water

Water-cooling towers offer large savings when water might otherwise be wasted. But, as pointed out under the wet-bulb discussion, evaporation occurs, and the water that passes into the air stream must be replaced. When the water temperature is above that of the dry-bulb temperature of the air, some of the cooling is done by the flow of sensible heat from the water to the air; and the evaporative loss is less than when the water temperature is below the dry-bulb, with the inflow of sensible heat being offset by an additional evaporative cooling. Actual conditions may be analyzed by means of the psychrometric polygon.[12] The evaporative makeup may be estimated by considering the cooling action as totally evaporative, with 1,000 B.t.u. of latent heat being required per lb. of water vaporized. Then, since 100 lb. of water is cooled through 10 deg. F. with a surrender of 1,000 B.t.u., the evaporative loss may be considered at 1 lb. per 100, a make-up requirement of 1 percent per 10 deg. F. of water temperature range over the cooling tower.

Losses due to windage entrainment will probably average from 1 to 2 percent in an atmospheric tower, depending upon the prevailing wind velocities. Special drift eliminators reduce windage loss, but restrict air flow. Therefore, when drift eliminators are used on a conventional tower, to which the data of this article apply, the tower size must be increased by at least 30 percent. Entrainment losses from forced convection towers with efficient eliminators may be taken at about ⅓ of 1 percent.

Summary and Conclusions

1. Water cooling towers may be used with economy in the heat removal processes of the food industries.

2. The operation of a cooling tower is dependent upon the wet-bulb temperature.

3. Since water may not be cooled below the wet-bulb temperature during exposure to air, the temperature of the water entering any cooling device must be recognized as that of the wet-bulb temperature plus an economical approach to the wet-bulb, which will probably not be less than 5 to 6 deg. F.

4. Atmospheric cooling towers are dependent upon the winds for air supply, and the wind for peak conditions should be the one considered in designing the tower size. When the wind approximates 2 m.p.h., a forced convection cooling tower should be considered.

5. In the event that the wet-bulb temperature plus the approach exceeds the temperature for which the cooler is designed, the water flow and the cooler size should be increased.

6. In calculating the heat load to be dissipated in a cooling tower, the calorimetries of all subdivisions of the process must be considered.

7. The heat exchange calculations for water cooling by means of a cooling tower must be complete from the heat quantity to be removed to the ultimate rate of heat discard as controlled by the wet-bulb temperature. All intermediate heat exchange units must be in balance.

8. When used with vacuum pans, cooling towers should be sized after due recognition of the terminal difference between the temperature corresponding to the vacuum and the temperature of the cooling water.

9. The amount of makeup water required to replace evaporation is approximately 1 percent of the flow over the tower for each 10 deg. F. drop in the temperature of water.

10. In atmospheric towers, losses due to windage entrainment will run from 1 to 2 percent for open type conventional towers similar in construction to Fig. 2. If drift eliminators are added on the leeward side, the tower size should be increased by at least 30 percent.

References

1. H. B. Hull, "Household Refrigeration." Nickerson and Collins Co., 4th Edition, 16, 1933.
2. Edward Simons, Water Cooling Tower Fundamentals. *Chemical & Metallurgical Engineering*, 83, Feb., 1939.
3. Walker, Lewis, McAdams and Gilliland, "Principles of Chemical Engineering." McGraw-Hill Book Co., Inc., 3d Edition, 1937: (3a) p. 366; (3b) p. 370; (3c) p. 585; (3d) p. 12; (3e) p. 119.
4. Edward Simons, Cooling Tower Psychrometry-III. *Chemical & Metallurgical Engineering*, June, 1942.
5. W. V. Cruess, "Commercial Fruit and Vegetable Products." McGraw-Hill Book Co., Inc., 2nd Edition, 1938: (5a) p. 134; (5b) p. 122; (5c) p. 133; (5d) p. 317.
6. American Can Co., "The Canned Food Reference Manual." 2nd Edition. 216. 1943.
7. W. H. Adams, "Heat Transmission." McGraw-Hill Book Co., Inc., 1st Edition. 149, 1933.
8. "The Refrigeration Data Book." American Society of Refrigeration Engineers. 509, 1942.
9. J. C. Albright, Analysis of Summer Weather Data in the United States. *A.S.H.V.E. Transactions*, vol. 45. 415. 1939.
10. D. N. and J. N. Lewin, How to Match Retort Output With Steam Capacity. *Food Industries*, 88, August, 1945.
11. Barnard, Ellenwood and Hirshfeld. "Heat-Power Engineering." John Wiley and Sons, Inc., Part III, 3rd Edition. 878, 1933.
12. Edward Simons, Cooling Tower Psychrometry-II. *Chemical & Metallurgical Engineering*, May, 1942.
13. Edward Simons, Capacity Control for Atmospheric Cooling Towers. *Chemical & Metallurgical Engineering*, June, 1945.